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ABSTRACT

The 39 medical educators attended a 2-day conference to resolve some of the disparity which exists in the knowledge and utilization of audiovisual aids and to define the role of learning resource centers. Major presentations were: (1) "The Continuing Confusion in Communications" by J.F. Wolker, (2) "Visual Systems: Pro and Con" by R.S. Craig, (3) "Application of Audiovisual Technology in Medical Education" by N.L. Cole, (4) "Concepts in Communication: A Multi-Screen Presentation" by E.W. Murphy and J.W. Parker, and (5) "Standardization: The Manufacturer's Viewpoint" by R.H. Bell and M. Waterbor. In addition, four panel discussions were held on the topics of Basic Science Education and Audiovisuals, The Use of Audiovisuals in Clinical Teaching, Hospitals, and Meeting the Needs of Continuing Education. Participants recommended that a national resource center be established to serve as a repository for information about available audiovisuals. Further, opportunities should be provided for identifying learner needs and wants and for defining teaching objectives. Finally, educators must exert leadership in setting up standards and guidelines for selection and utilization of audiovisual media. (SB)

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The Proceedings Of

A National Conference On The Use Of Audiovisuals In Medical Education

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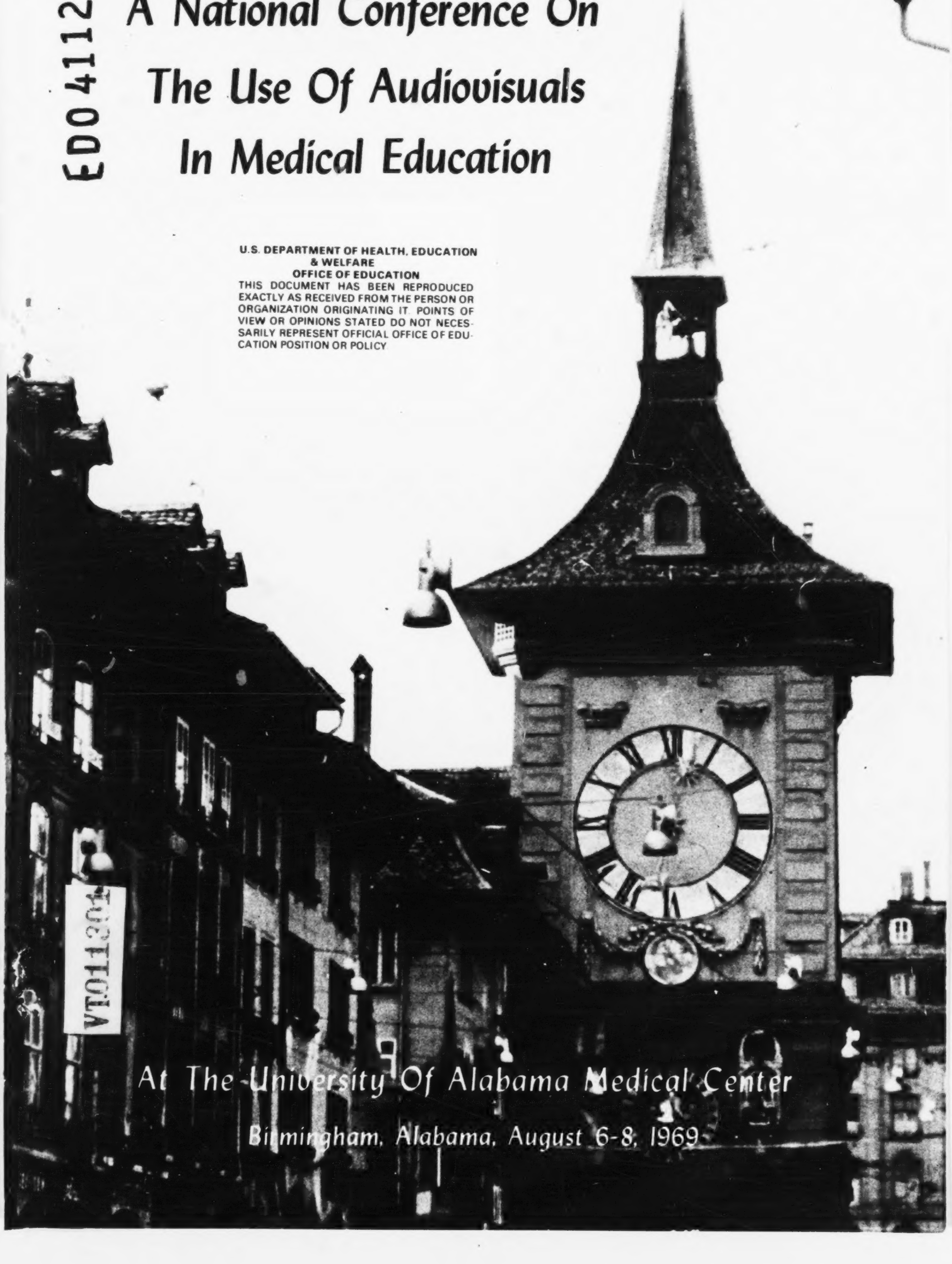

VT011304

At The University Of Alabama Medical Center

Birmingham, Alabama, August 6-8, 1969

TABLE OF CONTENTS

PROGRAM 1

PARTICIPANTS 4

WEDNESDAY, AUGUST 6, 1969 (MORNING) PLENARY SESSION

Opening Remarks
Dr. Margaret S. Klapper 9

Welcome Address
Dr. S. Richardson Hill, Jr. 11

Notes From A Latitudinarian
Dr. John J. Sharry 12

Introduction of Dr. Joseph F. Volker, Keynote Speaker
Dr. Clifton K. Meador 16

The Continuing Confusion in Communications
Dr. Joseph F. Volker 18

WEDNESDAY, AUGUST 6, 1969 (AFTERNOON) PLENARY SESSION

Plenary Session
Dr. Donald M. Pitcairn 31

Introduction To "Audiovisuals In Medical Education"
Dr. Norman L. Cole 33

Visual Systems—Pro And Con
Mr. Robert S. Craig 34

Application Of Audiovisual Technology In Medical Education
Dr. Norman L. Cole 44

Concepts In Communication – A Multi Screen Presentation
Messrs. Eugene W. Murphy and James W. Parker 51

THURSDAY, AUGUST 7, 1969 (MORNING SESSION)

Standardization – The Consumer's Viewpoint
Dr. Edward C. Rosenow, Jr. 55

Standardization – The Manufacturer's Viewpoint
Dr. Richard H. Bell 60

Standardization – The Manufacturer's Viewpoint (The Fairchild Experience)
Mr. Mel Waterbor 64

PANEL DISCUSSIONS

Basic Science Education And Audiovisuals
Dr. Robert S. Stone, Chairman

Introduction
Dr. Robert S. Stone 67

Teaching Microbiology By Closed Circuit Television
Dr. William G. Walter 68

An Integrated System For Instructional Television, Including Self-Study And Laboratory Communications
Mr. Melvin C. Shaffer 75

A New Approach To Computer Assisted Instruction In Health Science Education
Dr. Merlyn C. Herrick 81

Towards A Fusion Of Technology And Curriculum In Preclinical Teaching
Mr. Louis G. Audette 85

The Use of Audiovisuals in Clinical Teaching
Dr. Francis Wood, Chairman

The Use Of Audiovisuals In Clinical Teaching — The Input Requirements
Dr. James Dyson 89

The Production Opportunities
Mrs. Marion Johnson 94

Some Thoughts On A National Audiovisual Delivery System
Lt. Col. George Caras 99

The Evaluation Hangups
Dr. F. L. Husted 104

Hospitals
Dr. Max Michael, Jr., Chairman

Introduction
Dr. Max Michael 108

Are Materials Relevant To The Job?
Mr. Theodore G. Kummer 109

To Better Use The Tried And True
Dr. Norman S. Stearns 112

The VA And AV
Dr. Harold M. Schoolman 115

The Wizardry Of TV – Or Is It?
Dr. Lamar Crevasse 118

Meeting The Needs In Continuing Education
Mr. Norman Tucker, Chairman

Introduction
Mr. Norman Tucker 120

The Challenge And Opportunity Provided By Videotape In Medical Education
Mr. Richard S. Burdick 121

Can Audiovisuals Satisfy The Demand For Individualized Continuing Education?
Dr. Ruth M. Davis 125

Communications In Postgraduate Medical Education
Dr. Thomas C. Meyer 130

Regional Medical Program Applications Of Instructional Media In Continuing Education
Dr. Phyllis Carns 136

Audiovisuals As Media For Continuing Education In The Hospital Setting
Mr. Robert B. Shamaskin 140

THURSDAY, AUGUST 7, 1969 (AFTERNOON SESSION)

SPECIAL DEMONSTRATIONS AND TECHNICAL EXHIBITS

FRIDAY, AUGUST 8, 1969 (MORNING SESSION)

Panel Reports And Discussions 149

Basic Science Education And Audiovisuals
Dr. Robert S. Stone 151

The Use Of Audiovisuals In Clinical Teaching
Dr. Francis Wood, Jr. 155

Report Of Hospital Study
Dr. Max Michael, Jr. 156

Report Of The Needs In Continuing Education Panel Session
Norman E. Tucker 158

Summation and Recommendations
Dr. Rafael C. Sanchez 161

Closing Remarks
Dr. Clifton K. Meador 168

SPECIAL DEMONSTRATIONS

National Conference On The Use Of Audiovisuals In Medical Education – Special Demonstrations 169

TECHNICAL EXHIBITS

National Conference Of The Use Of Audiovisuals In Medical Education – Technical Exhibits 171

Those of us who were charged with the planning for this conference had appropriate conference titles or some sort of identity. Other reliable and willing people worked hard, long hours and deserve proper credit for the orderly conduct of the conference.

Mrs. Irene Harper and Mrs. Dorothy McGuire of Dr. Klapper's staff took care of all the correspondence, the registration and a variety of other arrangements.

Mr. Jim Anderson, the Director of Television Services for the Medical Center not only produced and directed all of the television shows but assumed responsibility for all of the technical requirements of the conference.

Mr. Richard Gunthorpe, Director of Photography for the Medical Center provided the slides used in the panel reports and a host of publicity pictures and poster photoduplicates.

Mr. Harold Rydberg, Director of Illustration and Design for the Medical Center designed the program artwork, produced the posters and the aids used in the conference.

The short interval available for production of many of these items meant for some, little sleep and substantial toil.

We are very grateful to these people.

Dr. Margaret S. Klapper
Mr. Norman Rydland
Dr. John Sharry

NATIONAL CONFERENCE ON THE

USE OF AUDIOVISUALS IN MEDICAL EDUCATION

August 6–8, 1969

University of Alabama in Birmingham
Medical College of Alabama

Engineering Building Auditorium
1919 Eighth Avenue South

CONFERENCE OBJECTIVE

The purpose of this conference is to resolve some of the tremendous disparity which exists among medical educators in their knowledge and utilization of audiovisual aids as educational tools and to define the role of the learning resource centers as they relate to medical education centers and hospital environments.

The conference is organized to permit maximal participation by those attending so that all facets of the subject may be explored.

CO-SPONSORS

U.S. Department of Health Education and Welfare, Public Health Service, National Institutes of Health, Bureau of Health Professions Education and Manpower Training, Division of Physician Manpower

and

Medical College of Alabama, University of Alabama in Birmingham, Birmingham, Alabama

CONFERENCE DIRECTOR

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Medical College of Alabama
University of Alabama in Birmingham

CONFERENCE ASSOCIATE DIRECTOR

Dr. J. J. Sharry
Assistant to the Vice President for Health Affairs,
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University of Alabama in Birmingham

CONFERENCE COORDINATING DIRECTOR

Mr. L. N. Rydland, P.E.
Division of Physician Manpower
Bureau of Health Professions Education and Manpower Training
N.I.H.; P.H.S.; D.H.E.W.

REGISTRATION

Lobby of Parliament House
Tuesday Afternoon and Evening,
August 5, 1969
2:00 – 5:00 P.M. and 7:00 – 9:00 P.M.

Lobby of Engineering Building, U.A.B.
Wednesday Morning, August 6, 1969
8:30 – 10:00 A.M.

FEE $25.00

WEDNESDAY, AUGUST 6, 1969

PLENARY SESSION

Engineering Building Auditorium

MORNING

Chairman: Dr. Clifton K. Meador

8:30–10:00	REGISTRATION	
10:00–12:00	OPENING REMARKS	Dr. Margaret S. Klapper
	WELCOME	Dr. S. Richardson Hill, Jr.
	NOTES FROM A LATITUDINARIAN	Dr. John J. Sharry
	INTRODUCTION OF KEYNOTE SPEAKER	Dr. Clifton K. Meador
	KEYNOTE ADDRESS THE CONTINUING CONFUSION IN COMMUNICATIONS	Dr. Joseph F. Volker

PLENARY SESSION

Engineering Building Auditorium

AFTERNOON

Chairman: Dr. Frank W. McKee

AUDIOVISUALS IN MEDICAL EDUCATION

National Medical Audiovisual Center

1:30– 1:35	INTRODUCTION	Dr. Norman L. Cole
1:35– 2:20	STRENGTHS AND LIMITATIONS OF AUDIOVISUAL SYSTEMS IN MEDICAL EDUCATION	Mr. Robert S. Craig
2:20– 3:00	APPLICATION OF AUDIOVISUAL TECHNOLOGY IN MEDICAL EDUCATION	Dr. Norman L. Cole
3:00– 3:15	DISCUSSION	
3:15– 3:45	BREAK	
3:45– 5:00	CONCEPTS IN COMMUNICATION–A MULTI-SCREEN PRESENTATION	Mr. Eugene M. Murphy Mr. James W. Parker
5:00	ADJOURN FOR DAY	

7:00–10:00 **Scientific and Professional Exhibits**
PARLIAMENT HOUSE MOTOR HOTEL

THURSDAY, AUGUST 7, 1969

MORNING SESSION
Engineering Building Auditorium
Chairman: Dr. W.B. Frommeyer, Jr.

8:30–9:30 **STANDARDIZATION–THE CONSUMER'S VIEWPOINT** .... Dr. Edward C. Rosenow
STANDARDIZATION–THE MANUFACTURER'S VIEWPOINT
.... Dr. Richard H. Bell
.... Mr. Mel Waterbor

9:30–12:30 **PANEL DISCUSSIONS (CONCURRENT)**

A) BASIC SCIENCE EDUCATION AND AUDIOVISUALS
Veterans Administration Hospital Auditorium – 9th Floor
Dr. Robert Stone, Chairman
Teaching Microbiology by Closed-Circuit Television .... Dr. William G. Walter
An Integrated System for Instructional Television, Including Self-Study and Laboratory Communications .... Mr. Melvin C. Shaffer
A New Approach to Computer-Assisted Instruction in Health Science Education .... Dr. Merlyn C. Herrick
Towards a Fusion of Technology and Curriculum in Preclinical Teaching .... Mr. Louis G. Audette

B) THE USE OF AUDIOVISUALS IN CLINICAL TEACHING
Engineering Building Auditorium
Dr. Francis Wood, Chairman
The Input Requirements .... Dr. James Dyson
The Production Opportunities .... Mrs. Marion Johnson
The Distribution System .... Lt. Col. George Caras
The Evaluation Hang-Ups .... Dr. Frank L. Husted

C) AUDIOVISUALS IN TEACHING HOSPITALS
Veterans Administration Hospital–Rm. 68B, 9th Floor
Dr. Max Michael, Chairman
Are the Materials Relevant to the Job? .... Mr. Ted Kummer
To Better Use the Tried and True .... Dr. Norman Stearns
The VA and AV .... Dr. Harold M. Schoolman
The Wizardry of TV–or is it? .... Dr. Lamar Crevasse

D) MEETING THE NEEDS IN CONTINUING EDUCATION
Rust Research Center Conference Room 130
Mr. Norman Tucker, Chairman
Challenge and Opportunity Provided by Videotape in Medical Education .... Mr. Richard Burdick
Can Audiovisuals Satisfy the Demand for Individualized Continuing Education? .... Dr. Ruth M. Davis

The Role of Communications in Continuing Medical Education in Wisconsin .... Dr. Thomas C. Meyer
Regional Medical Program Applications of Instructional Media in Continuing Education .... Dr. Phyllis E. Carns
Audiovisuals in the Veterans Administration .... Dr. Robert B. Shamaskin

12:30 **ADJOURN FOR LUNCH**

AFTERNOON SESSION

1:00– 6:00 **Demonstrations, Scientific and Professional Exhibits**
MEDICAL COLLEGE OF ALABAMA AND PARLIAMENT HOUSE MOTOR HOTEL
Tours of certain facilities in the Medical Center–Details to be provided at the conference

7:00–10:00 **Scientific and Professional Exhibits**
PARLIAMENT HOUSE MOTOR HOTEL

FRIDAY, AUGUST 8, 1969

MORNING SESSION
Engineering Building Auditorium
Chairman: Dr. Margaret S. Klapper

8:30–11:00 **PANEL REPORTS AND DISCUSSION**
Each report will demonstrate a different technique of presentation
8:30 **BASIC SCIENCE EDUCATION AND AUDIOVISUALS** .... Dr. Robert Stone
9:00 **THE USE OF AUDIOVISUALS IN CLINICAL TEACHING** .... Dr. Francis Wood
9:30 **AUDIOVISUALS IN TEACHING HOSPITALS** .... Dr. Max Michael
10:00–10:30 **BREAK**
10:30 **MEETING THE NEEDS IN CONTINUING EDUCATION** .... Mr. Norman Tucker
11:00–11:45 **RECOMMENDATIONS AND SUMMATION** .... Dr. Rafael Sanchez
11:45–12:00 **CLOSING REMARKS** .... Dr. Clifton K. Meador
12:00 **ADJOURN**

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WEDNESDAY, AUGUST 6, 1969

PLENARY SESSION

Engineering Building Auditorium

MORNING

Chairman: Dr. Clifton Meador

OPENING REMARKS

Margaret S. Klapper

Mr. Chairman, Ladies and Gentlemen:

It is my privilege and charge as Conference Director to call this National Conference on the Use of Audiovisuals in Medical Education to order by means of a few opening remarks. First, I wish to welcome each and all of you to the Medical College of Alabama and the University of Alabama in Birmingham. I sincerely hope that you will enjoy your visit with us and find the conference interesting, informative and stimulating.

Visuals to enhance the written or spoken word are not new. Charts, maps, models, and blackboard illustrations have so long been melded into the art of teaching and are so familiar we tend to think of them as part of teaching itself and not as aids, failing to recall that they actually preceded the storing of words—writings and books. Today, we speak of the technology explosion and communications media in awesome tones—overwhelmed by their potential and complexity, we are fearful of our individual abilities to cope and tend to be resistive. Most university staff, with the exception of small groups of enthusiasts, seem apathetic toward or have considerable suspicion of "devices" and "machines" as substitutes for themselves and hence a threat. The recent feats of our astronauts and the sight of our President talking by phone to men on the moon bear dramatic witness to the reality of audiovisuals and other communications media in the everyday life of peoples everywhere. We in medicine must expand our minds to encompass these media in our own fields. "Old dogs must learn new tricks!" The young must learn from and about these media as they pursue their education and development.

A guiding principle in education is that only after first identifying the objective should the methods and techniques be selected by which to achieve the objective. A second principle is that no one teaching method or technique should be considered in isolation. Audiovisuals are but extensions of the individual teacher, not a replacement of what in the past has proved serviceable. Effectively used, modern communications media should increase our teaching abilities, add a new dimension to the transport of knowledge, and result in greater efficacy of the educational system They pose a challenge rather than a threat to the teacher of today.

Success with present-day audiovisuals, however, demands teamwork. No longer can the individual teacher exist in isolation, planning and implementing his own teaching exercises. Sophisticated instruments and techniques of audiovisual education demand new allies—technicians, producers, etc.—and thus the "center", "office" or "library of learning resources" was born. Such units as these are springing up in our medical colleges and teaching hospitals, although there is little experience and meager information by which to pattern them. Dr. Frank W. McKee, in the press release of April 8, 1969, defined as the objective of this conference: "To cope with the tremendous disparity that exists among medical

Margaret S. Klapper, M.D., *Associate Dean, Medical College of Alabama and Director, Division of Continuing Medical Education, University of Alabama in Birmingham, Birmingham, Alabama*

81

educators in their knowledge and utilization of audiovisual aids as an educational tool and to define the role of the learning resources centers as they relate to medical education centers and hospital environments."

The conference has been structured to present the present state of the art of audiovisuals in medical education through discussion and demonstration of techniques. It provides opportunity for each of you to participate actively in discussions and verbal interplay. As educators, your ideas, opinions, and experience are needed to assist us in arriving at conclusions and in making recommendations which will be meaningful to us all.

Some years ago, I participated in a seminar on communications conducted by Robert Haakenson, Ph.D., of Smith Kline & French Laboratories. He used the key phrase, "Tell, tell and tell" as advice for organizing a speech. "First tell them what you're going to tell them; then tell them; then tell them what you've told them." Paraphrased for this conference, I have said what we hope to do, the remainder of today and tomorrow we will do it, and on Friday we will review, report and summarize what has been done.

Thank you, and it's nice to have you in Birmingham.

Dr. Margaret S. Klapper, Conference Director

WELCOME ADDRESS

S. Richardson Hill, Jr.

We are gathered here today to participate in a conference concerned with providing better medical education through the use of audiovisuals. As already indicated, the conference objectives are to work toward a resolution of some of the disparities which exist among medical educators in their knowledge and utilization of audiovisual aids as educational adjuncts and to work toward a definition of the role of the learning resource centers as they relate to health educational centers. We are pleased indeed to have so many representatives of university medical centers and teaching hospitals as well as representatives from schools of dentistry, pharmacy, nursing, osteopathy, optometry, and allied health. We are also pleased to have representation from undergraduate schools, medical publications, commercial companies and hospitals, as well as representatives from the Department of Health, Education and Welfare, the Veteran's Administration, and the Department of Defense. We are grateful to the Bureau of Health Professions, Education and Manpower of the Department of Health, Education and Welfare and to our own Division of Continuing Medical Education and Office of Learning Resources for making this national conference possible. We are particularly grateful to our distinguished participants for their willingness to serve the health interests of the country by participating in this important conference. The conference organizers have provided a full and what I believe will be a most excellent program, however, if any of the guests have interests outside of the organized program, the administration, faculty and staff of the University of Alabama in Birmingham would be happy to serve these interests in any way you might desire.

Although the written and spoken word have dominated our entire educational process in the past, there is little doubt that today these means are inadequate not only for **health education** but more importantly for effective biomedical communication generally. Like the use of the computer, the use of audiovisual communications can often free up the time of scarce faculty and other health personnel to carry out those duties which can only be carried out by human beings. Not only can one free up vaulable personnel by the use of audiovisual material, but often the use of audiovisual learning techniques will result in superior learning. It has been said that audiovisual aids provide invaluable assistance in an accelerated teaching-learning process by transmitting more knowledge to more people with more retention and in less time.

However, I believe it is apparent to all of us that the application of audiovisual technology to the educational and communication problems in the health field has, in fact, been extremely limited. There are many reasons for this, not the least of which is the lack of compatibility and reliability of equipment and materials. Perhaps of even greater importance than the lack of compatibility and reliability is the lack of understanding and knowledge of what is available and what can be done in this field on the part of administrators and health educators generally. We are hopeful that over the next two and a half days this conference will at least in a small way help resolve some of these problems.

S. Richardson Hill, Jr., M.D., *Vice President of Health Affairs, University of Alabama in Birmingham, Birmingham, Alabama*

NOTES FROM A LATITUDINARIAN

John J. Sharry

As a latitudinarian, I have no fealty to one audiovisual medium over another, or in fact, to audiovisual materials over books and live instruction. Presently, each can claim its own triumph. Movies provide consistent and descriptive color for visual records of action. Television provides visual broadcasting capacity. Books can be quickly and easily scanned. Teachers, by their informal as well as formal live presence, can be the tangible model of a good life.

My true loyalty in these regards is to education. I am not more (or less) interested in medical education than in dental or nursing education or in higher education in general. Furthermore, we should mark it a mistake to limit our educational efforts to one audience; to students only or to practitioners only. (Students are at least as important as practitioners. In fact, as agents for change, they are more important).

Nurses and all of the paramedical personnel not only need and deserve the products of our educational thought, but when thus educated, become an influential stimulus causing physicians and dentists to intensify their own continuing education.

And, as in all relations between the seeker and the provider of services, education of the patient not only eases the practitioner's work but inevitably ends with a better educated and more effective doctor.

If we agree that audiovisuals of all sorts can improve education for a broad spectrum of learners, why have we delayed and still delay their widespread use? First, we recognize that audiovisuals serve teaching and, like it or not, since the Second World War, teaching has not been the preoccupation of many American universities. Research, so long neglected during previous decades, was rushed up toward equal stature with teaching. During this rush, we set up systems for extramural funding which discouraged thoughtful administrators from maintaining a teaching-research balance when at last it was achieved. After all funding agencies preferred to support inarguable tangibles and students' lives are hardly as tangible as research papers. The latter can generally be judged within a few years, the former only after a much longer time; if ever.

There is nothing at all invidious about this state of affairs; much to the contrary, it is the result of quite human and generally responsible behavior. But, like all pendular movements, we can learn lessons from it.

Because we must respond to the pleas of those two eloquent advocates for teaching; population pressure and student pressure we will surely have to increase our use of audiovisuals. But they are relatively new to us and they are expensive. Our symbol the clock tower, perhaps the first audiovisual device, didn't appear until the fourteenth century; most of the usual machines are a product of this century. On that account, universities, many of which have been expected to develop extramural funds for their operation, will have to seek sources of support for these programs. Here, we can apply the lessons of the research-teaching pendulum. We should not let our funding procedures develop in a reactive fashion,

John J. Sharry, D.M.D., *Director of Office of Learning Resources, University of Alabama in Birmingham, Birmingham, Alabama*

responding to loud demands and to the persuasions of power. We must establish guides which can discriminate between promise and propaganda.

Currently, we have almost a religious preoccupation with evaluation and innovation as part of the supportable criteria for projects. These two bandied words, which appear to carry solace for funding agents, are, in many ways, currency for gamesmanship and thus obstacles to the pursuit of widespread use of audiovisuals.

The effects of new media cannot be evaluated by techniques which are insensitive to some of the most important dimensions of education such as imagination, intuition, personality and creativity. Our knowledge of the learning process is inadequate to allow us to separate for measurement all of the broad, interlocked intangibles which are part of education. We must still accept the holistic view, for when we do separate off what we can measure, we are left with an important and handsome residue which remains primarily esthetic.

The vacuity of many of the articles in research on educational technology and their constant contradiction, one of another, is likely due to their failure to attend the many variables. If one could measure scientifically the persuasiveness of a teacher, and one could assess the talent of the television producer or the skill of the movie director, and one could assign values to the attractiveness of the subject matter and the effects on response, of the size and comfort of the audience, how could they be realistically weighed?

As badly as we may need them I'm afraid that we are still a long way from the precision of measurement which (because most of us are scientists) will offer us comfort. The caldron of contradiction is not a happenstance. Complicated attempts to quantify health sciences education have not been impressive because we can only vaguely define the professional's job. The simpler, post facto surveys which industry has used effectively appear for the time being to show the most promise. For example, we can determine whether anyone really watched a film or tape or whether they were staring glassy eyed because the tape was terrible but they were captive. We can discover how long a film loop for self study lasts before it needs replacement. We can keep count of the number of times per day or week or month that materials are checked out of the pool. Our temptation is to mark these kinds of evaluations too unsophisticated to merit support. We seek instead some illusive "scientific" tests.

The evaluation argument has an interesting analogue in the current discussion among university administrators concerning the role of systems engineering in higher education. Some traditionalists claim that practically nothing in education is amenable to systems development. Other, more gullible souls insist that everything is. Obviously neither position is long defendable. We do purchase furniture and paper and chemicals and grass seed, and we do establish procedures for the use of libraries and cafeterias and parking lots. There, systems engineering can help. But it can tell us little about motivation and integrity and kindness and imagination. Similarly, evaluative techniques can provide creditable answers for quantifiable questions but can do little to help us predetermine what kind of "soul" will emerge in the audiovisual lessons. Just as the cry for evaluative criteria (which were impossible) may have denied us true incentives for teachers, similar demands today may be delaying the wide adoption of audiovisuals. **Again I must emphasize that my complaint is not that we don't need the testing procedures but rather that today we do not have the testing skills.**

The other catchword of present day educational technology is "innovation." This respectable and once innocent word has turned mean. It, also, has restricted our efforts to advance. Too many of us consider any idea which is not a new "theory of relativity" to be unworthy of support. I suspect that there are some agencies which each year set out on a quest for the innovative grail so earnestly that they search and sort until at last, near the close of their year, they fund in a fuss almost any program that uses more than an alphabet and an abacus.

We need new and alternative models in health sciences education. We should support methods which are innovative but are not necessarily new creations. In fact, the Congress stipulated in its legislation for higher education that the word innovation should not be construed as "first time ever" but rather "first time in the situation." There is a real need today to produce and exchange audiovisuals at a rate great enough to identify the good ones by consensus. We are behind and this is one of our few alternatives.

There is some danger when a word, such as innovation, becomes one of the rules of the game. It encourages on that account lip service rather than conviction. The Committee for Economic Development recognized this in a 1968 report entitled "Innovation in Education." They stated:

"In a system of weak incentives, one can expect the persons involved to pay lip service to innovation—to provide the shadow but not the substance of change—with the result that a half hearted adoption of a new practice results in poor performance, which in turn, disillusions others who might (otherwise) have tried it."

We know that some of our current educational practices are not effective and that we must develop new ones. We know that the innovative task will be easier in new subjects and new curricula. We know too that we must distinguish between innovation and mere change for propaganda's sake. We must recognize that as attractive as innovation may be, it has by its nature few rules and by that token it has a corollary. That corollary, risk, is not only unattractive to those who are charged with the support and management of projects, it is downright disquieting. Sadly, we cannot have one without the other. It would appear then that we may have to proceed with the firm conviction that a broadside approach will likely yield the best results.

Beginning in our own institutions, we must commit substantial monies and categorical administrative support to seminal programs. We cannot afford lip service. We must be realistic about the burdens associated with faculty engagement in the production of and the use of audiovisuals and we must be realistic about our own claims to our own faculties. It is senseless to talk of computer assisted instruction if 35mm slide projectors are scarcer than electron microscopes. We must identify good teachers (they are not necessarily the academic stars) and nurture them, making the production and use of audiovisual materials as easy as possible for them. Production facilities should be brought to them whenever practical, rather than the reverse. We must use common sense about our teacher—performer and our audience. For example, blind insistence on verbatim scripts can strangle the personality of the good teacher. On the other hand, the approach which "wings it" is both expensive and wasteful of time. Time is always important and there is obviously no sense in a three hour film which begins, proceeds and ends with all the force and charm of a logarithmic table. We can learn much from Hollywood and from Madison Avenue for after all, despite some obvious differences in goals, they have been in the information business a long time.

Extra university funding agencies should embrace with universities, the risk taking adventure. Support should be provided for creative humans who are identified by consensus rather than by some sophistic metric system Bet first and heaviest on the experienced and successful, but because they are not sufficient, bet also on the new faces and on those young who are intelligent and imaginative. Bet on hard work and bet on the university which has the reputation for intellectual aggression and excellence. Bet on common sense which agrees that, as little as we know of the learning process, few can doubt that repetition obviously improves knowledge. Don't worry that at the present time we can't measure our odds and that we can't find enough new miracle creations. Put money into many programs for as long a term as practicable. Look warily at those institutions which ignore the promise of different media and claim that one medium will do the whole job. Intellectualism has never been narrow minded.

Look to consortia for funding, government can accomplish great things with private agencies, two or more groups funding better programs than any one alone.

Sidestep slogans and jargon and fads and hucksters. Look instead for programs which will survive the most solid kind of test; they will be adopted by peers and will attract permanent support to take their place in health education alongside library books and blackboards.

INTRODUCTION OF DR. JOSEPH F. VOLKER, KEYNOTE SPEAKER

Clifton K. Meador

For a member of the administration to introduce his own president at a national meeting is a challenge, to remain within the time constraints and not overdo it or underdo it, but to try to be accurate. I think the word "audiovisual" may be as an appropriate word for Dr. Volker as any I can think of if that word means anything that can be heard, said or seen, because his interests are broad and so long standing in so many subjects. I found that his interests really began with history in high school. This was self taught and poorly recognized by his teachers, so he first was a history scholar, and this interest has continued through the years. Somewhat later he became a clinical dentist and then returned to the University of Rochester to complete his doctoral work in biochemistry and then, I suppose, became a biochemical dentist! At least, he took one of the first looks at flouride and its relationship to dental health and dental decay and made many fundamental observations while serving as a biochemist and a clinical dentist. He then was on the faculty for a very brief period of time, but was interrupted by a deanship at Tufts, that being interrupted by his move to Alabama in 1948, where he really began his important work. This work has been directed toward the development, planning, and truly the building of an urban university. His first official appointment here was as Dean of the Dental School, that being the first deanship of the newly created School of Dentistry. In the intervening years, he has served as Director of Research, Director of Graduate Studies and Graduate Education, then Vice President for Health Affairs. With the creation of a four-year College of General Studies a few years ago, he became Vice President for Birmingham Affairs for the University of Alabama in Birmingham, and then with the birth of our finite University in June, he became our first President of the University of Alabama in Birmingham. His contributions reach out beyond Birmingham; I can't go through all of them, but in summary fashion, he is consultant and advisor on health affairs in at least seven foreign countries, he is consultant or advisor on health education to eleven states and their state universities and private universities. He personally directed the Arizona Study on Medical Education. He has had a long standing and interested participation in National Institutes of Health and National Dental Research committees and advisory groups, last serving on the President's Commission on Health Manpower. His honors, and honorary degrees are many, some from distant lands such as Thailand, some with exotic Kipling-sounding names like The Order of the White Lion from the government of Czechoslovakia. Perhaps his highest awards or those which are most meaningful are the ones right here, the Distinguished Faculty Lecturer Award in 1966 by the faculty of this institution and the highest honorary award by the Alumni Association of the University. To those who work closely with him, perhaps his greatest talent is to see things of the present in some flow of history; to be able to identify where we are at this point of time in the history of any process, and then from this to be able to extrapolate something about the future. His title today tells us where we have been and where we are, and that it is confused, and so I anxiously await his projections for where we are going in this field.

Clifton K. Meador, M.D., *Dean, Medical College of Alabama, University of Alabama in Birmingham, Birmingham, Alabama*

It is my great privilege to present our Keynote Speaker, Dr. Joseph F. Volker, President, University of Alabama in Birmingham.

THE CONTINUING CONFUSION IN COMMUNICATIONS

Joseph F. Volker

It is your good luck or misfortune, as the case may be, to be the first national conference to meet on this campus since the announcement of my appointment to the presidency of the University of Alabama in Birmingham. Under the circumstances, it was inevitable that you would be subjected to a favorite story concerning occupants of that post.

A happy and well adjusted young academician was serving as an assistant professor in a science department of a good university. He had ample time for research and limited lecture and laboratory assignments with classes of well prepared students. Unfortunately, his superior qualifications came to the attention of the administration, and when the chairmanship of the department became vacant, he was appointed to the position. In this capacity, he had less time for research, less time for teaching, and an increasing number of administrative headaches. Although his level of happiness was reduced, he performed well in the new assignment, and when a dean was needed, he was the choice of the president and the trustees for the appointment. In this role, he had to forsake research, had virtually no direct contact with teaching, and was beset with numerous administrative problems. Despite his unhappiness, he again functioned effectively and ultimately succeeded to the presidency of the university.

As president, he was far removed from his initial loves, teaching and research, and overwhelmed with the duties of his office. All in all, he was a very unhappy individual. When he was at last rescued by death, it was anticipated that services to his university specifically and to mankind generally would insure quick entry into heaven. Unfortunately, he had committed indiscretions that in the judgment of the deity demanded that he serve time in purgatory. The full impact of the sentence was never appreciated—because the transition had been so gradual. Perhaps the continuing confusion in communications had conditioned him to the change.

The committee had hoped to offer you better fare. Their original ambition was to have an astronaut because in their judgment the greatest example of the power and majesty of audiovisuals is exhibited in the Apollo space programs. Alas, they quickly learned that such a possibility was as remote as a lunar orbit. Next they hoped to entertain you with the new Assistant Secretary for Health in the Department of Health, Education, and Welfare, but the American political system did not cooperate. With time running out, lofty aspirations defaulted to practical considerations. The moral to this story is that a bird in hand is worth more than one in flight or one out of sight.

I have come to the presidency too late in my career to learn to use a speechwriter. A product of an era and institutions that expected first hand contact with relevant literature, I repaired in haste to the library, hoping that the experience would be rewarding. Fortunately, over a period of years I have had a peripheral relationship to the subject of the conference. This caused me to review selected issues of EDUCOM and served as a reminder that I had been general chairman of the 1966 three-day Conference on Educational Communications at Duke University in Durham, North Carolina.[1] At the conclusion of the meeting, I

Joseph F. Volker, D.D.S., Ph.D., *President Elect, University of Alabama in Birmingham, Birmingham, Alabama*

indicated with some irreverence that either Duke's Mixture or Bull Durham would be an appropriate description of the proceedings.

I also scanned the three volumes that have been assembled by the Rochester Clearinghouse for information on various aspects of instruction in medical education and reviewed the monograph *Health Sciences Television* that records the papers presented at the seventh annual meeting of the Council on Medical Television.[2,3,4,5] Thanks to our continuing contacts with the PHS Communicable Disease Center in Atlanta, I was acquainted with two PHS supported volumes, *Toward Improved Learning* and Biomedical Communications: *Problems and Resources.*[6,7] To make certain that my efforts included something old and something new, I perused both the *Selected Papers of John Shaw Billings* and the more recent issues of the journal *Medical and Biological Illustration.*[8]

A statement from the former is noteworthy. Speaking of the medical literature (in 1881), Billings said:

> *What is to be the result of this steadily increasing production of books? What will the libraries and catalogues and bibliographies of a thousand, or even of a hundred years hence be like, if we are thus to go on in the ratio of geometric progression, which has governed the press for the last few decades? The mathematical formula which would express this, based on the data of the past century, gives an absurd and impossible conclusion, for it shows that if we go on as we have been going there is coming a time when our libraries will become large cities, and when it will require the services of every one in the world, not engaged in writing, to catalogue and care for the annual product. The truth is, however, that the ratio has changed, and that the rate of increase is becoming smaller.*[9]

Perhaps if Billings were living today the 6,000 medical publications with their more than 250,000 articles per annum and a rate of growth that doubles every twelve years would reduce his optimism and alter his perspective.[10]

The cursory review of the literature increased my awareness of the two great forces—the information and the population explosions—that have combined to make the subject of this conference particularly relevant. The cited statistics are ample evidence of the magnitude of the information explosion, but if they were not available, each of us, regardless of whether he were scientist, clinician, or administrator, could attest to its validity.

Two personal references may be pertinent. One involves graduate, the other professional education. In the late 1930's I was a candidate for the Ph.D. at the University of Rochester. At that time, the biochemistry department had a primary interest in the lipids, and graduate and professional students were expected to be rather knowledgeable in this area. Fortunately, this requirement could be met in part by mastering the information contained in 169 pages that comprised the small but excellent monography, *The Biochemistry of the Lipids*, authored by Henry B. Bull. By 1943 this reference source had been replaced by *The Biochemistry of the Fatty Acids and their Compounds, the Lipids*, a 387-page summary by Walter R. Bloor. The latter publication in turn was replaced during the 1950's by a 2,966-page compendium *The Lipids, their Chemistry and Biochemistry*, authored by Harry J. Deuel, Jr.[11]

It was predictable that the accelerated rate of growth of our knowledge of lipids would result in the creation of specialty journals. In the closing months of the 1950's the *Journal of Lipid Research* appeared, and in the mid-60's a companion publication *Lipids* was inaugurated. Both have six issues annually containing as many as 25 articles each.

Although this illustration is taken from a basic science field, comparable examples could be cited in areas more directly related to a clinical science, dentistry. In the latter part of the 19th century a complete dental education was assured by a mastery of *The American System of Dentistry* (1886-1887) edited by Wilbur Litch. This three-volume work had a total of approximately 3,000 pages. It may be contrasted with the present required undergraduate textbook list at the University of Alabama School of Dentistry, which exceeds 18,000 pages.[12]

The implications of the information explosion in health communications have been of obvious concern to the government. They led President Kennedy to state in a 1962 message to Congress:

> *The accumulation of knowledge is of little avail if it is not brought within reach of those who can use it. Faster and more complete communication from scientist to scientist is needed, so that their research efforts reinforce and complement each other; from researcher to practicing physician, so that new knowledge can save lives as swiftly as possible; and from the health professions to the public, so that people may act to protect their own health.*[13]

The Surgeon General of the Public Health Service responded by organizing a four-day Conference on Health Communications.[14] Most of the attention of the conferees was devoted to subjects which bear a considerable similarity to those under discussion today. In retrospect, I would say that the intensity of the problem has increased, but public awareness has also heightened, and substantial technological progress has been made toward its solution.

The population explosion and its sequelae affect almost every aspect of our lives. On the one hand we strive to limit births and on the other to cope with the great increase in the numbers of people by providing housing, employment, education, consumer goods, food, transportation, utilities, and vital services. Prominent in the latter category is health care. Obviously, this requires a marked increase in the number of physicians, nurses, dentists, pharmacists, and allied health workers trained at both the technical and professional levels. Their initial and continuing education is a matter of national concern as indicated by President Johnson's appointment of a National Advisory Commission on Health Manpower. The report of this body recognized the specific needs for greater use of automated teaching methods. They recommended, among other things, that the "Federal Government markedly expand support specifically designated for research in the educational process for physicians and other health personnel."[15] As a member of the Commission, I can assure you that the need for greater use of audiovisuals was acknowledged by all concerned.

The passage five years ago of the Health Professions Educational Assistance Act has provided substantial financial support for the construction of the facilities needed to cope with relevant manpower deficits. Within the framework of the legislation, it is also possible to provide learning resource centers. Although a growing number of institutions have availed themselves of the opportunity, a substantial number have not. In my opinion this has not been done out of ignorance or antagonism to the concept but rather they have been victims of circumstance.

There is a never ending internecine academic struggle between established departments, who argue from a position of strength, and emerging interdisciplinary units. In almost every instance, the former seems to require the majority of new resources. There is stiff competition between the institution-wide services for whatever remains. Under these circumstances, resources centers must vie with computer laboratories, animal house needs, instrument shops, etc., and each of these has a substantial number of advocates. Moreover, many of the established departments have as integral parts of their operation medical illustrators, photographers, and television personnel. It is most difficult to persuade them that these costly conveniences should be replaced by a central facility.

The problem is often compounded by the lack of concern of the medical schools for the welfare of the other disciplines that make up a health center. Yet, one of the strongest arguments for learning resources centers is that they can meet the needs of a great variety of health educational programs, including technical, undergraduate, graduate, professional, and postprofessional. It is of little consequence if we give a superb education to the physician member of the health team and neglect the education and training of those who will work closely with him in the delivery of health care.

The standard curriculum for many years has emphasized lectures, laboratory and clinical work, and textbook and journal assignments. These activities have come to be identified with the learning process. They are firmly entrenched, and innovation faces a long and uphill battle. In our society these traditional methods of instruction are associated with preparation for a vocation, whereas audiovisuals are more strongly identified with avocational interests. Inevitably this will change, especially as certain influences become manifest.

One of these is more generalized and effective use of audiovisuals in grade schools, high schools, and colleges. It is encouraging to note that these institutions are turning in increasing numbers to the newer technologies and learning resource centers are commonplace in non-professional educational units. Perhaps we will arrive at the stage where students will expect and demand similar advantages in health professional schools.

Another positive force is the growing dependence of the entire populace on television. This has been documented in a recent report by Roper Research Associates.[16] They have compared the change in public attitude toward various communications media in a carefully designed investigation covering the 1959-1968 period.

In response to the question, *"First I'd like to ask you where you usually get most of your news about what's going on in the world today—from the newspapers or radio or television or magazines or talking to people or where?"* they found that the position of television increased from 51% in 1959 to 59% in 1968 (Figure 1). During the same interval, newspapers fell from 57% to 49% and radio from 34% to 25%. Reliance on magazines and people was essentially unchanged and was less than 10%. These percentages total more than 100% because they include multiple answers. When the data was further refined, to exclude the multiple answers, the newspapers showed a drop from 21% in 1959 to 19% in 1968 (Figure 2). In this interval, television increased from 19% to 29%.

Figure 1

	12/59	11/61	11/63	11/64	1/67	11/68
Source of most news	%	%	%	%	%	%
Television	51	52	55	58	64	59
Newspaper	57	57	53	56	55	49
Radio	34	34	29	26	28	25
Magazines	8	9	6	8	7	7
People	4	5	4	5	4	5
Don't know or no answer	1	3	3	3	2	3
Total mentions	154	157	147	153	158	145

Figure 2

Source of most news	**12/59** **%**	**11/61** **%**	**11/63** **%**	**11/64** **%**	**1/67** **%**	**11/68** **%**
Newspapers only	21	19	21	20	18	19
Television only	19	18	23	23	25	29
Both newspapers and television (with or without other media)	26	27	24	28	30	25
Newspapers and other media but not television	10	11	8	8	7	6
Television and other media but not newspapers	6	7	8	6	8	5
Media other than television or newspapers	17	15	13	12	10	13
Don't know or no answer	1	3	3	3	2	3

Subsequently, the subjects were given the question, *"Suppose that you could continue to have only one of the following—radio, television, newspapers or magazines—which one of the four would you most want to keep?"*

The position of television was again a favorable one (Figure 3). It increased from 42% in 1959 to 50% in 1968. Within this period, newspapers declined from 32% to 24%.

Figure 3

Most want to keep	**12/59** **%**	**11/61** **%**	**11/63** **%**	**11/64** **%**	**1/67** **%**	**11/68** **%**
Television	42	42	44	49	53	50
Newspapers	32	28	28	27	26	24
Radio	19	22	19	15	14	17
Magazines	4	4	5	5	3	5
Don't know or no answer	3	4	4	4	4	4

The subjects were given a further question, *"If you got conflicting or different reports of the same news story from radio, television, the magazines and the newspapers, which of the four versions would you be most inclined to believe—the one on radio or television or magazines or newspapers?"* (Figure 4). In 1959, 29% listed television, and this increased to 44% in 1968. In a similar interval, 32% considered newspapers most believable in 1959, but only 21% in 1968.

Figure 4

Most believable	12/59 %	11/61 %	11/63 %	11/64 %	1/67 %	11/68 %
Television	29	39	36	41	41	44
Newspapers	32	24	24	23	24	21
Magazines	10	10	10	10	8	11
Radio	12	12	12	8	7	8
Don't know or no answer	17	17	18	18	20	16

Two other excerpts from the report are worthy of mention because they relate educational levels to viewing habits. In response to the question, *"Would you like to see more of the special interest type of entertainment, or more of the general interest type of entertainment, or do you like the balance that now exists?"*, it was apparent that as the educational level rises, the desire for special interest type of entertainment predominates (Figure 5). Whereas only 18% and 28% of grade school and high school respondents respectively voted for this type of program, it was preferred by 59% of the college educated subjects.

Figure 5

By education	Grade School %	High School %	College %
Want more special interest	18	28	59
Like balance now	48	45	27
Want more general interest	26	23	11
Don't know or no answer	8	4	3

The daily time spent watching television was established through the question, *"On an average day, about how many hours do you personally spend watching TV?"* (Figure 6). It is interesting to note that it increased approximately

Figure 6

	11/61	11/63	11/64	1/67	11/68
Medial hours of viewing	2:17	2:34	2:38	2:41	2:47

Median reported hours of viewing by:	11/61	11/64	1/67	11/68
College educated	1:48	2:04	2:10	2:17
Upper economic levels	2:02	2:14	2:21	2:24

30 minutes in the period 1961-68 for both the average viewer and the college educated one. The fact that college educated people now spend more than two hours a day viewing television and are especially desirous of having more educational type programs is, in my judgment, particularly significant.

I am optimistic that the numerous forces that have delayed the full utilization of audiovisual technology in the health sciences will diminish. Pressures of the information explosion demand that we utilize newer technologies in the transmission of health knowledge, and the pressures of the population explosion demand that we educate unprecedented numbers of people at all levels of skill to perform health services. Increased acceptance of audiovisual techniques in the education of students from kindergarten through college and the establishment of the media as a foremost source of recreation of university trained people have created a millieu most favorable to audiovisual instruction in the medical sciences.

Although overall progress will be substantial, I expect that the slowest advance will be made in the education of medical, dental, and graduate students. In these areas, preceptorial instruction has been firmly established, and good teacher to student ratios have prevailed. Moreover, the faculty has for a variety of circumstances considered this to be their traditional and major instructional responsibility.

In contrast, there could be a very rapid and complete acceptance of the media in the more peripheral instructional units. Two of these demand immediate attention, continuing education for a wide variety of health workers and basic education for vast numbers of allied health students at both collegiate and vocational school levels. Thanks to Regional Medical Programs and the Allied Health Professions legislation, increasing amounts of Federal funds are becoming available for these purposes. The magnitude of the task and the current commitments of institutions negate the conventional approach and favor mass media, particularly audiovisuals.

If universities are to meet challenges in this area, they will inevitably acquire the necessary equipment and personnel and develop the prerequisite skills. The existence of these resources within health sciences centers should result in their growing acceptance and utilization in the more traditional programs. In short, encirclement and infiltration will succeed where a frontal assault may be expected to fail.

History records that academic institutions failed to assume full responsibility for internship and residency training, and this learning experience suffered. It is noteworthy that the Health Manpower Commission specifically recommended that they do so.[17] It is quite possible that this is also an appropriate time to consider the university's responsibility for continuing education for physicians and other health professionals. At the moment coordinated instruction in this area is a rarity. This is to be deplored since it could and should lead to the more efficient delivery of health care. In this connection, it should be appreciated that the quickest and most inexpensive way to relieve the physician manpower deficit is to increase the competency of the existing practitioners. According to one calculation, "a four percent increase in the productivity of physicians (in private practice, internship, and residency) would add more than the current graduating class to the effective physician supply."[18]

Comparable thought should be given to the posture of the university relative to the education of the public in health matters. The needs in this area, it will be recalled, were highlighted in President Kennedy's message to Congress. Perhaps they should be a major responsibility of the schools of public health, working with affiliated hospitals, professional societies, and other educational institutions. From the advertisements that almost daily pass over my desk, I have the distinct impression that current efforts are disjointed, fragmentary, and generally ineffective.

Obviously audiovisual technology would be of inestimable value if affirmative decisions were made in either or both instances.

My deepest concern is that the universities will not measure up to the great challenge. Alfred Whitehead has said:

> *The universities are schools of education, and schools of research. But the primary reason for their existence is not to be found either in the mere knowledge conveyed to the students or in the mere opportunities for research afforded to the members of the faculty.*
>
> *Both these functions could be performed at a cheaper rate, apart from these very expensive institutions. Books are cheap, and the system of apprenticeship is well understood. So far as the mere imparting of information is concerned, no university has had any justification for existence since the popularisation of printing in the fifteenth century. Yet the chief impetus to the foundation of universities came after that date, and in more recent times has even increased.*
>
> *The justification for a university is that it preserves the connection between knowledge and the zest of life, by uniting the young and the old in the imaginative consideration of learning. The university imparts information, but it imparts it imaginatively. At least, this is the function which it should perform for society. A university which fails in this respect has no reason for existence. This atmosphere of excitement, arising from imaginative consideration, transforms knowledge. A fact is no longer a bare fact: it is invested with all its possibilities. It is no longer a burden on the memory: it is energising as the poet of our dreams, and as the architect of our purposes.*[19]

Hopefully, the advocates of audiovisual instruction in the health sciences will share Whitehead's aspirations for the university.

I apologize for the inadequacies of this presentation, but I take consolation in the response of a member of the space program when asked to comment on his assignment of interpreting photographs of Mariner VI's Mars sweep. He said, "It's something like a veterinarian's looking at an elephant through a telescope and trying to diagnose what's wrong with it by studying the wrinkles in its skin."

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17. **Report of the National Advisory Commission on Health Manpower, Volume 1**. Washington: U.S. Government Printing Office, 1967, p. 31.

18. Rashi Fein. **The Doctor Shortage: An Economic Diagnosis**. Washington: The Brookings Institution, 1967, p. 138.

19. Alfred North Whitehead. **The Aims of Education and Other Essays**. A Mentor Book. New York: The New American Library of World Literature, Inc., 1949, p. 97.

NOTE: All figures are from **A Ten-Year View of Public Attitudes toward Television and Other Media**, a report on six national studies by Burns W. Roper, President of Roper Research Associates, published by the Television Information Office, 745 Fifth Avenue, New York City 10022, March 1969.

WEDNESDAY, AUGUST 6, 1969

PLENARY SESSION

Engineering Building Auditorium

AFTERNOON

Chairman: Dr. Donald Pitcairn

AUDIOVISUALS IN MEDICAL EDUCATION

National Medical Audiovisual Center

PLENARY SESSION

Donald M. Pitcairn

I am Dr. Donald Pitcairn, Chief of the Physician Education Branch of the Division of Physician Manpower. I wish to thank Dr. Meador for his brief introduction this morning. In considering the purposes of organizations and, often of meetings, I am reminded of the question once put to Dr. Robert Oppenheimer when he was Director of Princeton Institute for Advanced Study. When asked what he and his highdomed colleagues did at the Princeton Institute, he simply said *"What we don't understand, we explain to each other."* I trust that this meeting will have a different destiny.

I am here representing Dr. Frank W. McKee, Director of the Division of Physician Manpower, who was unavoidably detained in Washington. Dr. McKee asked me to express his regret that he could not be here to greet you.

The Division of Physician Manpower is an integral part of the Bureau of Health Professions Education and Manpower Training. The Division is a focal point in the Federal Government for the support and study of physician manpower and activities related to medical education at all levels–undergraduate, graduate and continuing education. In support of its mission it administers programs to increase the supply and effectiveness of physician manpower in the form of institutional grants to medical schools, as well as through the provision of contract funds and research grants for studies in medical education. The greatest part of its budget rests in the institutional grant support programs. We are concerned with numbers of physicians, but I don't think that we are so naive as to think that the physician shortage, whatever its magnitude, will be solved simply by recruiting vast numbers of medical students or building a great number of new medical schools.

In all attempts to increase the enrollment of medical students, an equal concern must be that the quality of their education remain high and, if possible, be improved. I think that there is good reason to believe that the process of medical education can be improved. So it is of particular interest and gratification to us to participate as a co-sponsor with the University of Alabama Medical Center in supporting a program addressed to the use of audiovisuals in medical education. I wish to convey the appreciation of Dr. Leonard D. Fenninger, Director of the Manpower Bureau, and of Dr. McKee to Dr. Klapper and her very able staff here at the Medical Center for organizing this program. I also wish to express my personal appreciation to two members of my staff, Mr. Rydland, who is the Conference Coordinating Director, and Mr. Norman Tucker, who will be speaking to you later in the session. I bring you Dr. McKee's greetings and best wishes for a successful and useful conference.

At this point, I am pleased to introduce Dr. Norman Cole, who has some introductory remarks as a preface to this afternoon's session. In the interest of conserving time, I will ask Dr. Cole to introduce Mr. Craig. Titles by themselves often mean little. Accordingly, I might briefly describe the background of Dr. Cole who is presently acting chief of the Educational Studies and Development Branch of the National Medical Audiovisual Center, a component of the National Library

Donald M. Pitcairn, M.D., ***Chief, Physician Education Branch, Division of Physician Manpower, Bureau of Health Professions Education and Manpower Training, N.I.H.; P.H.S.; D.H.E.W.***

of Medicine at the National Institutes of Health. Dr. Cole has been with the Center for 12 years. His past positions have included Chief of the Utilization and Distribution Section and Chief of the Graphic and Photographic Arts Section. Born in Atlanta, Georgia, he received his Bachelor of Fine Arts degree from the University of Georgia in 1949, a Master's degree in Fine Arts in 1950 and a Doctorate in Education in 1966. In the past several years he has worked extensively and in depth as consultant to deans and faculty members of medical schools and other schools of health professions and international organizations of health and medical interests. His work has included many site visits to study local communications problems, and/or to conduct conferences, seminars and workshops. In addition, members of his branch are responsible for the design of packages of audiovisual communications tools and the development of supportive written materials. There will be a question period at the conclusion of the presentations.

INTRODUCTION TO "AUDIOVISUALS IN MEDICAL EDUCATION"

Norman L. Cole

Many of the problems facing medical educators today are, in part, communications problems. I am speaking, in particular, of problems related to the explosions of student population, knowledge, and curriculum content and the many demands made upon the professional's time. There is an urgent need for using improved methods of transmitting information—

from researcher to researcher,
from researcher to practitioner, and
from researcher or practitioner to the public.

And there is a great need for improved means of training great numbers of ancillary and professional personnel.

We believe that the distribution of information in audiovisual form will accomplish certain things:

Among the public, the use of audiovisuals will help people help themselves by becoming better informed of their health needs and by seeking professional assistance when it is needed.

In professional education, the use of audiovisuals will help students help themselves, save faculty time, result in better and more uniform instruction, and provide information that often cannot be delivered easily through more traditional means.

To assist you in tomorrow's planning sessions, first we would like to review briefly the strenghts and limitations of audiovisual systems as we know them today.

Secondly, we would like to cite, from personal experience, some of the problems related to using audiovisuals, and approaches to solving these problems.

And last, we will review very briefly some of the ways in which audiovisual means can be and are being used in professional education.

In the simplest terms, communication involves a sender and a receiver. Audiovisuals can provide the communications vehicle connecting sender and receiver.

Norman L. Cole, Ed.D., *Acting Chief, Educational Systems and Development Branch, National Medical Audiovisual Center, Atlanta, Georgia*

VISUAL SYSTEMS -- PRO AND CON

Robert S. Craig

Communication is one of the world's most important activities, and the visual image is finally being recognized as the most effective communication form in all human existence.

There is no doubt that sight is the most domineering and the strongest of all of our senses. In fact, this sense of seeing is so important that the term itself has come to mean the same as understanding in our everyday language. For example, we never hear anyone express understanding of information that they have received by saying, "I hear." Instead, the common terms used to express understanding are, "I see," or "I get the picture." Our minds usually conceive thoughts in terms of pictures or visualizations. This is the natural thing to do; to "see" with our minds is to perceive visually. Since we do think in terms of visualizations, or pictures, it is only reasonable that we can enjoy more accurate and understandable communications through the use of "visualized thought."

Therefore, my main purpose in the next few minutes is to deal with some advantages, disadvantages, and innovations in those visual systems that involve projected images.

There are two basic categories which encompass all projected visual systems—the motion and the still. The motion category includes motion pictures and television. The audiovisual systems in this category are the most dynamic for four reasons:

(1) The moving image presents a very strong illusion of life.

(2) The apparent rhythm of reality sets up rapport with our own mental concepts of the rhythm and reality of life.

(3) The revelation of something new continually taking place within a restricted aperture tantalizes our mental anticipation and demands our attention.

(4) The primary advantage that both motion picture and television hold in common is the ability to combine sight and synchronized sound, thus providing a definite continuity of action.

TELEVISION

Slide	The first visual system I want to discuss is television. Television is primarily a delivery system.
Slide	For the first time in the history of education we have a standardized uni-medium delivery system which can effectively communicate all visual forms—slides, motion pictures, etc.
Slide	It is a system which makes it possible for many students to view the details of procedures or demonstrations directly from the professor's point of view, and at the same time he is performing the function at his own laboratory table.

Robert S. Craig, *Special Education Programs Officer, Educational Studies and Development Section, Educational Systems and Development Branch, National Medical Audiovisual Center, Atlanta, Georgia*

Slide It is a system that makes possible many unique and fully integrated learning situations.

For instance, the TV camera can be attached to a microscope providing . . .

Slide . . . students with a magnified image of living organisms which is most impressive.

Slide It is a system by which images can be recorded on videotape for instant playback, or for storage and utilization in the future.

Slide Thus, the learner could be free to review and study videotapes on his own TV monitor and at his own leisure.

Slide We must remember, however, that if teachers continue to use the straight lecture technique on TV, they are not taking advantage of the dynamic aspects of sound and motion.

Slide Lectures should be supported by good, clear artwork.

Slide If diagrams and charts are used they should be easy to read and uncomplicated.

Slide Many carefully selected visuals that illustrate the subject accurately should be used.

Slide The TV film chain makes it possible to incorporate all these visual materials (motion pictures, slides, etc.) into any lecture.

Slide While videotape is relatively inexpensive to produce, providing you own the equipment, . . .

Slide . . . it cannot be utilized without videotape playback equipment which is still quite expensive.

Slide However, by the use of the tape-to-film transfer machine, the best material now being produced . . .

Slide . . . can be placed on motion picture film for nationwide distribution even though produced inexpensively on videotape.

Slide This way, any of the convenient film or 8mm cartridge systems can be used for delivery of the material.

Slide Now, all of these facts make television, in its present state, the most economical mass communication medium we have available to us today.

Slide Also, I would be remiss if I didn't mention that the technological improvements taking place now in the electronic industry are indeed promising, . . .

Slide	. . . such as simplification and improvement of color TV cameras . . .
Slide	. . . and the development of self-contained thin wall hung television tubes suggest the feasibility of large, sharp, and full color images for classroom use.
Slide	Miniaturization of component parts means . . .
Slide	. . . production of lighter, more compact TV cameras.
Slide	The development of portable videotape recorders . . .
Slide	. . . and these in turn result in the development of even more compact units like this one manufactured by "Roberts" using 1/4" video tape.
Slide	Research on Laser type light sources for television projection offer tremendous possibilities . . .
Slide	. . . like this being carried on in the research laboratories of Zenith Corporation which produces . . .
Slide	. . . a very acceptable color image, suggests the possibility of large and brilliant **projected** color television images which can be viewed in partially lighted rooms.
Slide	CBS's new Electronic Video Recording, referred to as EVR, offers many possibilities in regard to a uni-medium delivery system.
Slide	With this system any type of sound visual can be converted to an EVR master recording by means of an Electron Beam Recorder. Either color or black and white images can be recorded on the same material.
Slide	The EVR master is then used to make any number of prints by means of a special duplicator. These prints are then placed . . .
Slide	. . . in plastic cartridges and will be available for sale at a very reasonable cost, as little as $12.23 for a 20 minute program.
Slide (Black)	Let us look at EVR in action.
	16MM FILM CLIP
Slide	As these and other developments are perfected, . . .
Slide	. . . as color video tape and camera equipment costs are reduced making color television a practical reality . . .
Slide	. . . we may find that the ultimate delivery method for all audiovisual forms will be . . .
Slide	. . . the television screen. A truly standardized uni-medium delivery system.

MOTION PICTURE

Slide (Black) Now, let us consider briefly some aspects of the motion picture medium. The motion picture has not been able to accomplish adequately the overall needs in education because of some inherent difficulties. First, quality production is usually quite expensive. Secondly, it does not have the immediacy of television. But there are some things that nothing can accomplish as well as a motion picture.

The first advantage, **Animation** —is the process of adding life to inanimate objects. Let's look at a sample.

16MM FILM CLIP

Although animation is expensive and time consuming to produce, it does make it possible to explain some difficult subject matter clearly and quickly.

The second advantage of the MP medium is **Time-Lapse Photography**—this is a process by which the action of an object moving very slowly can be accelerated visually. For instance, (by use of time-lapse photography) a flower that may require two or three days to bloom can be shown blooming in less than a minute.

In order that we might better understand exactly what time-lapse photography is, let us take a two day vacation to the southwest United States in about 4 minutes.

16MM FILM CLIP

The third advantage of the motion picture medium is **Slow Motion Photography**—a process by which motion of an object moving extremely fast can be slowed down so that the motion can be analyzed. Slow motion photography is usually considered as any MP photography at a speed of approximately 64 frames to 5,000 frames per second. Now let us watch this procedure.

16 MM FILM CLIP

Research is presently underway to adapt all of these techniques to the television media; however, the present methods are strictly experimental and are not practical at the present time.

Today, the color sound motion picture offers us the most dynamic means of visual education presently available. By dynamic, I mean it can leave the deepest impressions which result in maximum retention and recall. Let me show you some fantastic footage that I think illustrates the dynamic aspects of the motion category.

16 MM FILM CLIP

We wish to thank Dr. Irwin Moon, of the Moody Institute of Science, for

	contributing the three film clips which you have just seen.
Slide	It is important to point out here that one of the greatest innovations in motion pictures has been the 8mm single-concept cartridge film.
Slide	As we use the term "single-concept film," we mean a short reel of film which presents only a single item a single practice, a single technique.
Slide	. . . it generally takes the shape of an 8mm motion picture continuous loop placed in a plastic cartridge.
Slide	A cartridge can be inserted into the projector in only one way, and when the ON lever is depressed, both picture and sound begin simultaneously.
Slide	Cartridges can be individually packaged in cardboard boxes to facilitate placement on library shelves. They can also be accompanied by both instructor and student guides.
Slide	Some of the 8mm automatic cartridge loaded projectors, are the Fairchild Mark IV magnetic sound unit, . . .
Slide	. . . the Technicolor 1000 optical sound projector . . .
Slide	. . . the attache case Bohn Benton magnetic sound unit . . .
Slide	. . . the MPO Videotronic Super 8 projector . . .
Slide	. . . and the cartridge loaded Panacolor equipment using a rather large cartridge . . .
Slide	. . . which holds a roll of 70mm film containing up to 2 hours of material.
Slide	An even newer system being developed by AB Dick is no larger than a shoe box . . .
Slide	. . . and offers tremendous possibilities in self directed study especially since it will sell for around $150.
	These then are some of the continuous play cartridge projectors.
Slide	However, since the continuous loop system does not permit instant replay of important material and there is no standardization of the cartridge design, . . .
Slide	. . . the Automatic reel to reel cartridge has been produced by Kodak which offers some additional possibilities, . . .
Slide	. . . for those who have Super 8mm movie cameras and wish to produce their own single concept film clips.
Slide	Original color film provides very good color reproduction when shown on fully automatic front screen projectors such as this new silent Ektagraphic 120.

Slide Sound can be added to these original films by using magnetic striped film on . . .

Slide . . . such recording projectors as the Kodak M 100A or the new . . .

Slide . . . Bolex SM8.

Slide After recording, this Super 8 sound film is rewound on the same reel that came from the processing plant.

Slide This reel is then snapped into an automatic film cartridge like this one designed by Bolex.

Slide These cartridges can then be stack loaded for fully automatic continuous showing . . .

Slide . . . in the new Bolex Multimatic Super 8mm sound projector.

Slide Other manufacturers are working on automatic reel to reel cartridge loaded equipment such as this Fairchild Eumig 711 which will use the Kodak reel and cartridge.

Slide Thus, the 8mm cartridge loaded projectors are bringing about a revolution in educational techniques in that they make practical the self-paced study or review of material by the student at his own convenience.

STILL PHOTOGRAPHY

Slide (Black) Now, I would like to discuss briefly, still photography. The effective use of still pictures is so simple and inexpensive, that every medical-health institution and in fact every professional should be involved in some phase.

Slide Included in the still picture medium are a vast number of systems—chalk boards, flip charts, opaque photographs, printed diagrams, models, etc. However, I am speaking primarily of projectables, slides, and filmstrips.

Slide Although the still category is not as dynamic as the motion category, it does present some distinct advantages that must not be overlooked.

Slide 1) The 35mm projected image provides the largest, sharpest, most correct color image possible with relatively inexpensive equipment.

Slide 2) Production of still projectables is about 1/10 as expensive as motion pictures.

Slide 3) Release prints are cheap enough to be given away.

Slide 4) Projection systems are considerably cheaper to purchase and maintain.

Slide 5) Updating of still projectables necessitated by new technical knowledge is less expensive and easier to do and, therefore, more likely to be done.

Slide Because of these advantages and the fact that most subject matter can be taught through a still picture medium, a tremendous amount of hardware is being developed by the audiovisual industry . . .

Slide . . . to make the use of still photographs simpler and more effective. Let's take a look at some of this equipment.

Slide Here is the Sound on Slide projector, manufactured by 3M. It is unique because the sound for each picture actually accompanies each slide.

Slide A magnetic sound disk encircles each of the 2 x 2 slides and provides up to 35 seconds of sound for each frame. Thus slides can be rearranged without re-recording.

Slide A newer and different approach to the filmstrip media is found in the Audiscan . . .

Slide . . . and the Labell Courier 16 equipment. This method is extremely practical.

Slide These machines use a continuous loop cartridge . . .

Slide . . . which contains both a 1/4" sound tape and a 16mm filmstrip.

Slide When this cartridge is inserted into the machine, all mechanisms are engaged automatically.

Slide Thus, the age of the synchronized sound still picture cartridge loaded projector is now with us.

Slide Compressed Speech is accomplished by this German-made device called the Eltro Information Rate Changer.

You may say, "Just what is Compressed Speech?" Well, listen closely and you shall hear. (Play sample tape.)

Slide . . . . Slide . . . . Slide

Slide There are some innovations taking place in the Still Picture Media that are also quite exciting. Holography, . . .

Slide . . . the process of recording and viewing a three-dimensional image by use of laser light. Although its development is in the horse and buggy stage it is undergoing some radical changes.

Slide This hologram developed by Bausch & Lomb does not require laser illumination for viewing.

Slide By using a small light source in a darkened room, a completely 3-dimensional image can be viewed with white light.

Slide Here we have attempted to photograph in two dimensions the aerial image of a Volkswagen produced by this hologram. This image is three dimensional in both the vertical and horizontal plane.

Slide An even newer photographic innovation is now in development by Dr. Korpel at Zenith Corporation.

Slide It is called Acoustic Bragg Diffraction and depends on the laser light source for its perfection.

Slide The final photographic image is the result of the diffraction of the light waves by a controlled high frequency beam of sound waves.

Slide The main implication of this system is the direct viewing or photographing of an enclosed object through seemingly opaque material. . . . (A broken bone viewed through the flesh.)

Slide Kodak's Visual Maker Kit using flash cubes as a light source and the . . .

Slide . . . Instamatic Camera coupled with two copy stands, one for 8" sq. areas and the other for 3" sq. areas . . .

Slide . . . makes the copying of illustrations and photographs from all types of printed matter . . .

Slide . . . an extremely simple and rapid procedure.

Slide The Lester Dine Instateck Clinical Camera also using the flash cube as the light source . . .

Slide . . . makes the photography of interesting clinical cases an easy and routine procedure.

Slide Aeroflex Laboratories have developed a system called **Multiplex Recording Photography** which makes it possible to record up to 400 full frame images on one piece of film.

Slide This means that a complete color slide series could be mailed in an envelope.

Slide The projector is quite simple in design and could easily be adapted for random access selection.

Slide Presently, the simplest and lowest cost random access projector available is the Kodak Carousel RA-950. With this unit, the slides can be shown in sequence and then any one of them selected at random to appear on the screen within 4 seconds for questions and discussions.

Slide A number of different companies have developed a lightweight tape playback machine like this one.

Slide A Kodak Carousel fits into the upper portion of the sound device.

Slide Narration recorded on another 1/4" half track tape recorder is . . .

Slide . . . loaded in a continuous-loop cartridge which is plugged into the machine. Then using a pulse control device, . . .

Slide . . . the inaudible slide changing beeps are recorded on the other half track of the tape. From then on the operation is entirely automatic.

Slide The advent of the Phillip's 1/8" magnetic tape cassettes and simple equipment for mass duplication . . .

Slide . . . is forcing manufacturers to produce a whole line of sound equipment like this Wollensak 2550 . . .

Slide . . . and this Elco Sound-O-Matic which will program automatic slide and filmstrip projectors.

Slide In fact, Viewlex has designed a completely portable AV kit for either slide or filmstrip viewing with a cassette sound recorder.

Slide The slides you have been viewing thus far have been projected by two carousel projectors using a dissolve control device which fades out the slide on one projector while it fades in the slide on the second projector.

Slide Now,—using only one carousel at $150 . . .

Slide . . . a sound synchronizer at $40 . . .

Slide . . . and a Sony 200 stereo tape recorder at $180 . . .

let us watch a sample of a sync sound slide show.

SHOW PARABLE
(Sync Sound Slide Series)

CONCLUSION

Visual Imagery: *as old as man himself.*

Projected Images: *relatively new.*

You know, a new invention, a new system, a new methodology is like a new continent. It is a vacuum begging to be filled, a ship seeking a captain, an opportunity searching for a chief.

The use of audiovisuals in communication and education is such a system, a methodology, an invention, if you please, but where are the captains, where are the chiefs?

We don't need any new means of communication, we merely need to use our present systems effectively.

Knowledge and Technology are leading the race and communication, poor, weak, frail communication is limping along about four laps behind.

Great amounts of information are available, but because we have not used audiovisuals effectively, this information is not being properly disseminated and used. But with the increasing simplification of audiovisual systems, the dissemination and utilization of knowledge can be far more effective.

The projected visual image should be welcomed as a tool for successful communication. Is your tool chest partly empty?

APPLICATION OF AUDIOVISUAL TECHNOLOGY IN MEDICAL EDUCATION

Norman L. Cole

INTRODUCTION

You have just seen reviewed a variety of audiovisual media, and heard a description of the strengths and limitations of each. Mr. Craig has painted a glowing picture of what can be done with technology that is available to all of us today.

Unfortunately, as one of your colleagues recently commented, it is difficult to find the bridge between the audiovisual ghetto in which he lives and teaches and the blue sky of audiovisuals which Mr. Craig so adroitly paints.

The problems in bridging this gap are many, but the chasm is not unbridgeable. In my presentation today, I will attempt to identify some of the problems, show some of the solutions, and suggest, if not action itself, those areas wherein action is required, with the assumption that the specific type of action is to be identified and recommended by you in your workshop sessions tomorrow. I would like to emphasize from the start, however, that audiovisuals are not a panacea. As one of my colleagues observed, a whole truckload of audiovisuals wouldn't necessarily solve the communications problems of some organizations. For, even with carefully prepared audiovisuals, we are faced with what might be called the "leading-the-horse-to-water" syndrome. Yet, in some instances, even simple means have been quite effective.

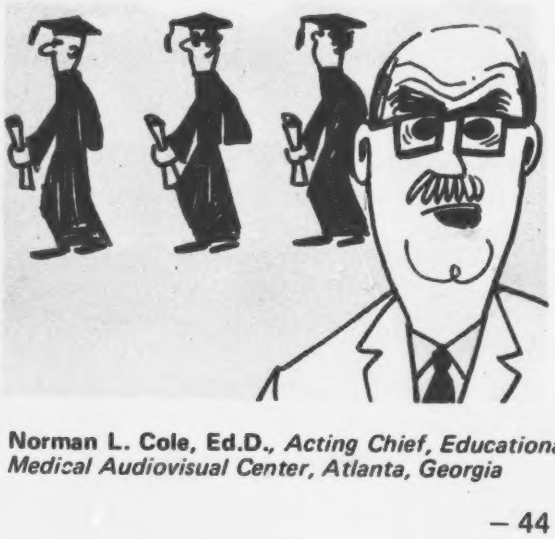
As Mr. Craig suggested—audiovisuals can be a working tool—a valuable working tool. But like any tool, audiovisuals must be designed specifically for the job at hand, and they must be used with skill if optimal results are to be achieved.

A working tool . . . the implication: There is a job to be done. What job? This must be defined in all of its ramifications before a solution can be sought. Specific pieces of audiovisual hardware should not be bought until the job has been defined—yet how often have we heard of instances where sizable funds have been spent for equipment that lies idle because either it was unsuited to the task, or there was no software available for use thereon.

Thus, whether one is considering the use of audiovisual technology in the basic sciences, for clinical instruction, within the hospital setting, or as a medium of continuing education, one must define carefully the parameters of the individual situation—the task that the tool must be designed to accomplish, and the conditions under which it will be used.

The problems are varied. Hopefully, the following slides, prepared with tongue-in-cheek, will serve as examples:

Illustration 1



From the harried research specialist . . .

"By the time the students know enough about anatomy to understand what the school hired me to teach, they have graduated.

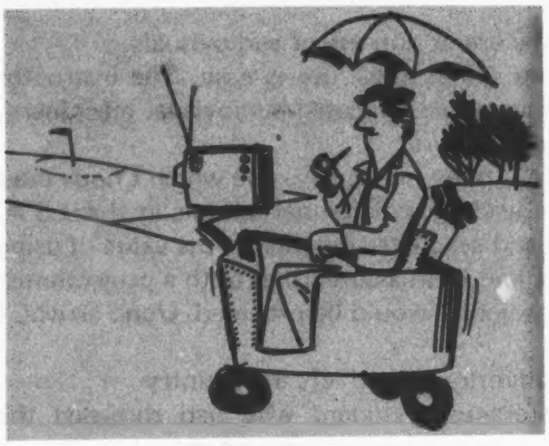
I spend all my time answering questions like 'What's a tibia?' "

From a representative of a national organization . . .

"For continuing education to reach our members, we must reach them where they are.

Norman L. Cole, Ed.D., *Acting Chief, Educational Systems and Development Branch, National Medical Audiovisual Center, Atlanta, Georgia*

Illustration 2



Perhaps putting TV on golf carts would be the answer."

From an instructor . . .

"I believe in lectures and note-taking . . . .

If my students didn't spend their time in taking notes, there'd be no reason for their coming to class."

From the administrator . . .

"Why waste money on 8mm projectors now, when next year there'll be other machines at half the price?"

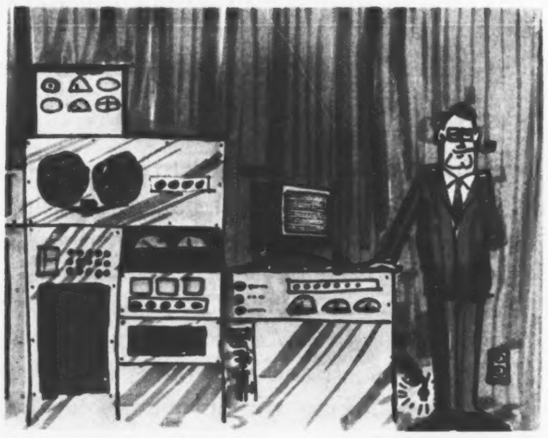
And from miscellaneous faculty members . . .

"I would enjoy teaching, if it weren't for the students."

"I'm against audiovisuals because they're 'canned,' and anything that is canned loses the living experience."

"If a student really wants to learn, he can learn from a lecture."

Illustration 3

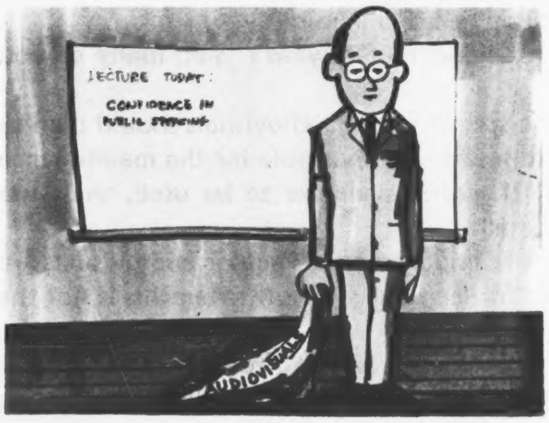


"What we need is television and a computer, and we'll be O.K."

"The trouble with putting my presentation on videotape is that I have to plan it out in advance."

"The trouble with being on videotape is that my colleagues pick my presentation apart."

Illustration 4



"Audiovisuals are just a crutch used by weak teachers to support themselves."

"We've never done it that way before."

"I'm against core curriculum."

"I don't want to be replaced by an audiovisual."

"Our problems are different."

The quotations you have just heard are interesting because they give insight into very real problems and concerns. And I am not surprised at resistance toward using audiovisuals, for in attempting to use those we have today, many instructors have met with justifiable frustration.

Four major factors contribute to the use or non-use of audiovisuals.

First, audiovisuals will not be used unless their use is easy. The instructor neither has the time and inclination to set up complicated audiovisual machinery, nor wants the embarrassment of mechanical failure.

Let me illustrate a situation I encountered personally, one which I hope does not reflect yours. The place: one of the leading professional schools in the U.S.A. The occasion: a presentation to faculty and graduate students on the value of using audiovisual media. Prior to my arrival, I had been assured that both a projectionist and an excellent sound-motion picture projector would be provided. Upon arrival, I found the following:

> The person who made the commitment had left the country.
>
> The "Projectionist" was a graduate student who had threaded the projector only twice before and had never threaded it for sound.
>
> I asked to borrow an overhead projector and was brought an opaque projector.
>
> I asked if the room had a Public Address system and was told "no." However, observing a microphone on the speaker's stand . . . I followed the cord, which had been painted when the wall was painted years previously, to an amplifier, which I turned on.
>
> I asked to borrow a projection stand. When one arrived, on it was a dusty but new overhead projector with the operating instructions still sealed in an envelope.
>
> The light on the lectern wouldn't light. A quick check showed that the cord was unplugged. As I inserted the plug into an outlet, I received a 115-volt shock.
>
> The exciter lamp on the 16mm projector wouldn't light. We waited while another projector was located and brought from an adjacent building.
>
> The pull-cords on the spring-loaded, black window shades had to be lashed to the radiators to keep the shades down.
>
> And finally, lights out, the motion picture projector was turned on, ran two minutes, then overloaded the circuit . . . and blew a fuse. Before we had this problem solved, we had blown three fuses . . . and secretaries from half the building were out in the corridors, looking disapprovingly in my direction, their electric typewriters having stopped.
>
> Fortunately, it was a lovely day, and a good time was had by all. A slide projector which I had brought with me behaved admirably.

Was this a typical situation? Let us hope that it wasn't. Yet, many of you may have had similar experiences.

Any organization which wants its personnel to use audiovisuals should plan to **provide a person**—other than the instructor—**who is responsible for the maintenance and handling of audiovisual equipment. If audiovisuals are to be used, their use must be easy**; otherwise, they will gather dust.

Secondly, the learning environment is important to whether audiovisuals are used. Learning spaces should be designed for learning, yet how often this is not the case.

At one school we visited recently, there was no air conditioning. During warm weather, which was most of the year, one had a choice, while projecting audiovisuals . . . of either a brightly lighted, hot classroom with open windows or an unbearable hot classroom with blinds drawn.

At another school, where a similar situation exists, there is the added dimension of noise both from an expressway and from huge exhaust fans in several of the classroom windows.

One class meets before 7:00 A.M. by popular demand.

Additionally, a liberal assortment of pillars within the classroom, though guaranteeing the stability of the roof, obstructs the view. Other schools may have other problems.

In another school, a lecture room is 25 feet wide by 125 feet long, with the floor tiered at an angle of approximately 45 degrees. I was advised, "Don't look at students beyond the first five rows or you'll get a stiff neck." This room is affectionately called "The Pit," and the local story is that students in the last ten rows get nosebleed.

Unique? Not at all. In at least two other schools, there are similarly long, narrow classrooms but with level floors, giving a tunnel effect. In one, in order to see the instructor, the students rely solely on TV monitors.

In the other, the instructor stands near one of the side walls, with students seated in semi-elliptical fashion facing him. Those in the end seats can neither read the blackboard, nor see projected material.

And in one hospital, we found the students' carrels in an open corridor directly opposite a bank of elevators.

To some degree, many schools and hospitals—even the most modern—have similar problems. Too often, and ridiculously, people must adapt to the physical environment rather than adapting the brick and mortar to the needs of the people.

If audiovisuals are to be used, one must design the learning environment of which they are a part.

Third, if audiovisuals are to be used, they must be available when and where they are needed.

This means easy accessibility. Any plan for action, therefore, should take into account the problem of locating what has already been done and is being done, both locally and nationally, and selecting those delivery systems which will make this material available to the user with the least possible effort, perhaps through the school or hospital library.

Catalogs are one means of making accessible information about audiovisual material that is available.

At the simplest level, there is a need for catalogs of material available within an individual school or hospital complex. Learning of such materials is not an easy task. Instructors have slides tucked away in desks. These slides are often excellent—but unidentified. Many are worth cataloging, duplicating, and being made available to others from a central point.

There is also a need for cataloging the wealth of material available nationally and internationally. For example, in both the areas of cancer and neurological and sensory disease, the National Medical Audiovisual Center's international index contains over 1,200 listings. And a recent computer printout in the area of surgery took 900 pages. Available listings of this type need to be assembled and organized so that they are easy to use.

Finally, if audiovisuals are to be used, they must be suited to meet one's need.

Therefore, at the highest level, comprehensive specialty catalogs should be prepared listing only those audiovisual materials which have been reviewed and at least subjectively evaluated. The instructor planning a series of presentations, the researcher seeking visual documentation, the practitioner with a particular problem, and the student seeking information: all could use such a catalog. Such a catalog should be so designed as to provide information that will allow the prospective user to judge the audiovisual's instructional potential for his particular group.

Who should undertake the task of locating and evaluating audiovisual material? In my opinion, the job is too big for any one instructor or perhaps any one school, with its limited resources, to handle. If schools can't do the job, who can? The instructor is in the position to analyze the curriculum, the audience, and possible uses of audiovisual materials by his students more validly than is a committee representing a group of schools or a national organization. On the other hand, a national group is in a better position to provide personnel, equipment, and time: resources critical to the development of effective communication materials. A broadly based and organized program is the only reasonable approach toward solving the problem.

In reviewing audiovisuals for the purpose of cataloging only those which are of value to a particular curriculum, one discovers areas for which little or no material is available—thus suggesting the need for production. Moreover, until such a survey has been made, one cannot know that time and money spent on new productions will not be wasted through duplication.

It is both possible and practical to produce audiovisual material at the local level with a minimum of means. A plan for action at the local level should, therefore, include a study of the feasibility of producing materials that cannot otherwise be procured, for use with one of the more common delivery systems. The simplest system may be slides or slides plus audiotapes.

The instructor cannot be expected to produce audiovisual material unless its production is easy. Therefore, the approach in a number of schools of medicine has been to establish a department of biomedical communication, or a communications arm within the department of medical education. Such a department has as its purpose the provision of those skills and talents required to work with faculty members, analyzing curriculum content and specific communications problems and coming up with means or products for their solutions. Such a department can also serve as the focal point for purchasing and maintaining audiovisual equipment, so as to insure ease of operation and compatibility throughout the school, hospital, or medical complex. The department may also be the focus for acquisition and distribution of audiovisual software—and for designing the learning environment.

Let us now review ways in which some schools and hospitals are using audiovisuals to assist in solving the communications problem.

Problem: To get information on the detection and diagnosis of oral cancer to dentists in rural Kentucky. It was assumed that the practitioner in the field would not have access to audiovisual equipment.

Solution: A set of 93 slides and a semi-programmed text, designed by Dr. Sheldon Rovin, University of Kentucky School of Dentistry, and a battery operated slide viewer, were sent to each dentist.

The text asks the practitioner to examine a slide such as this one.

It also provides him with information about the patient.

The dentist is then asked a question.

Answer choices are presented in a multiple-choice format.

He then turns to a subsequent page where his selected response is discussed.

If his response is incorrect, he is told why it is incorrect and is asked to select another response.

If his response is correct, he is directed to proceed.

Problem: In downtown Atlanta, to provide a system through which professional staff and students throughout the metropolitan area . . . could participate in Grady Memorial Hospital's conferences, CPC's, guest lecturers, etc., without the necessity of traveling to the hospital.

Solution: The Community Medical Television System, giving line-of-sight broadcasts to hospitals and medical organizations within a redius of 25 miles, . . . with direct "hot-line" telephone service for questions.

In addition, videotape replays at another hour for those who missed the live broadcast.

In South Carolina, a somewhat similar system reaches physicians throughout the state—by cable to high schools and subscribing hospitals, and through open-circuit TV. In this instance, question-and-answer sessions are handled locally.

Illustration 5

Problem: Training student nurses and ancillary personnel in certain rehabilitation nursing procedures.

Solution: at NYU: A series of 36 8mm sound motion pictures, cassette loaded for ease of use by persons without training, in operation of audiovisual equipment—with projectors placed at nursing stations for use at odd hours, or when needed.

Problem: To provide 24 hours a day, to physicians everywhere, information on the management of emergencies in practice.

Solution: "Dial access" audiotapes at the University of Wisconsin. There is always a pharmacist on duty who can receive a telephone request and plug a cassette-loaded audiotaped response into a special audio-playback.

Problem: To provide live audiovisuallly-supported instruction over distances without special video cable, often to a number of points simultaneously.

Solution: "Telelectures," slides, motion pictures, or videotapes are mailed in advance for local showing on cue in support of a presentation.

The speaker makes his presentation by telephone or two-way radio, and answers questions.

Wisconsin, Albany, and the Harvard University School of Public Health, to mention but a few, use this system.

CONCLUSION

Problem: To provide instructional experiences on the student's own time which require a variety of media.

Solution: Special learning carrels, in lab or in library, readily accessible to students' living or work area.

Student receives information or instruction by audiotape, film, videotape, or the printed work; is involved in practical exercises, directed to a variety of media, and told whether or not his responses are correct.

Examples: Anatomy at the School of Medicine, University of California in San Diego; physiology and pathology—Medical College of Virginia; obstetrics, University of Washington.

Problem: Consultation where patient and specialist are separated by miles.

Solution: University of Nebraska, 24-hour-a-day closed circuit, two-way television by cable between Norfolk and Omaha, over which practitioner and patient or ancillary staff talk; also, courses are conducted and patients and families can visit.

Another example: Again, CCTV: to connect Massachusetts General Hospital with Logan International Airport. From the airport . . . a nurse with a patient requiring emergency treatment can benefit from two-way communication with a specialist at the hospital.

Problem: To save practitioners time in delivering routine information to patients or their families.

Solution: At Piedmont Hospital, Atlanta—sound/slide presentations in a "black box" that can be used in clinic areas or patient rooms. Automatic and repeating, the machine is turned on by a single button and shuts off automatically.

Another Solution: From California—cassette-loaded sound motion pictures on pre- and postnatal care. The hardware starts with the push of a lever, shuts off automatically. Self-contained, with ear-phones if desired. Available commercially on a rental basis.

Problem: To reach practitioners and nurses throughout the states of Washington and Alaska with information in audio and still image form. System must be easy to use and capable of being programmed.

Solution: Placement of cassette-loaded 16mm sound filmstrip projectors in hospitals throughout the region. Automatic audio stop after questions allows students time to respond while picture remains on screen; students pushes "go" button to proceed.

Problem: Instructor conducts CPC's and nobody can see detail in X-rays on light box.

Solution: TV camera zooms in for close-up; contrast adjustment emphasizes details; all students can see.

Similar solutions in oral surgery, gastroenterology, anatomy, with the added fillip in angiography that video tape can be replayed, slowed up, stopped for study or to emphasize an individual image.

The uses to which audiovisuals can be put are almost limitless—the limit, in part, being our own ingenuity and imagination.

Since our budgets are also limited, however, we are faced with hard practical problems as we select our working tools—problems which vary with the ramifications of each individual situation.

(1) If the equipment is priced within our budget and will meet the requirements of our job, are there good films or other audiovisual materials available in sufficient variety and applicability to justify its purchase—or must we produce our own?

(2) And, if we have the machines and the software, have we encouraged use of these tools by making them available when and where needed, by providing suitable environmental conditions, and by making them easy to use?

If our answers to the above questions are yes, then we are well on our way toward a successful, audiovisually supported program.

Thank you.

CONCEPTS IN COMMUNICATION
A MULTI SCREEN PRESENTATION

Eugene W. Murphy and James W. Parker
Eastman Kodak Company

This presentation demonstrated the use of three screens for simultaneous and integrated projection of 35 millimeter slides and 16 millimeter movie film. Both were accompanied by a sound track which related to all three screens. This particular show, pleasant enough, did not relate except in the most tangential way to medical education. It was entertaining and it was instructional and suggests that it is possible to use this intricate means to some advantage in medical education.

Eugene M. Murphy, *Sales and Engineering Representative, Motion Picture and Education Market Division, Southeastern Region, Eastman Kodak Company*

James W. Parker, *Sales and Engineering Representative, Motion Picture and Education Market Division, Southeastern Region, Eastman Kodak Company*

THURSDAY, AUGUST 7, 1969

MORNING SESSION

Engineering Building Auditorium

Chairman: Dr. W.B. Frommeyer, Jr.

STANDARDIZATION – THE CONSUMER'S VIEWPOINT

Edward C. Rosenow, Jr.

Introduction

When I was invited to take part in this Conference on the Use of Audiovisuals in Medical Education, I confess my immediate enthusiastic acceptance reflected a personal feeling that audiovisuals would be more effectively used if there weren't such a variety of materials available. However, I soon began to wonder if this was really so much a problem. One could make a fairly strong argument that the development of ever more sophisticated audiovisual techniques has been directly due to the lack of any real efforts at standardization. It would be easy to imagine the lack of progress in this field if some super agency had set standards a number of years ago. Perhaps better coordination and organization of information and availability of audiovisual materials would predispose to more effective usage.

Some other reasons may contribute to the disparity between the various means and their effective use. Leading the list would certainly be a lack of coordination between what the producer wants to get across and the needs or desires of the consumer to be educated. Too little time is spent on what objective the producer and consumer have in mind. Frequently the objective of the producer or at least the result of his effort is to demonstrate a technique of communication rather than to communicate. The consumer also has a tendency to be overly impressed by the machine or gadget. Another very simple deterrent is the expense any individual or even a hospital incurs in trying to mount a good educational program utilizing adequate audiovisuals. Very early it is apparent that some subjects to be covered in this way are available only on videotape, or on 16mm film, or on 8mm film or on audiotape. Thus to plan any kind of comprehensive program the consumer must have a considerable variety of equipment and technical assistance to operate it efficiently.

Another reason it seems to me that too little effective use of audiovisuals is accomplished is the relatively low priority audiovisual techniques are given in most medical centers. In fact, even continuing education until very recently has itself enjoyed a "step-child" relationship in the medical center. A very strong recommendation can be made in the direction of standardization and that is to establish and fund adequately, important audiovisual departments in all major medical centers. This would do an immense amount of good in several ways. Expert technical help would be available to all departments. The right method to implement the right educational objective would have some chance of being used. Faculty time would be saved. Consumers, that is students, would have materials continuously available. Finally, such departments would be able to do excellent well-controlled experiments on effectiveness of all aspects of audiovisual communication aids.

Before considering some of the various techniques, a word should be said about the variety of ways in which consumers use audiovisuals. The consumer either tries to learn in a group or he tries to learn as an individual. If the group is small, probably one of the most effective audiovisuals is the blackboard. The overhead projector used with skill can almost duplicate this in a large group. Many

Edward C. Rosenow, Jr., M.D., *Executive Director, The American College of Physicians, Philadelphia, Pennsylvania*

individuals probably learn most effectively by reading. The biggest handicap to reading as the only method is that no one else helps the individual decide what is most important. It has seemed to me for quite a while that the biggest handicaps to self-learning are that the individual does not recognize his deficiencies and even if he does, it is not easy for him to pursue his study at the precise time he needs some new knowledge. Our College has recently done quite a bit to help him with the first of these through our Medical Knowledge Self-Assessment Program. No one yet has come close to solving his second problem by making available good educational materials in an easily used form when he wants them. It might be helpful now to consider a number of audiovisual techniques and see if standardization would make the medium more efficient. It makes sense to consider them more or less in order of age.

The Illustrated Lecture

The use of the chalk board is simple and effective. One medical center requires all lecturers to use only a chalk board. Incidentally, this center also requires he give his lecture without the aid of a loud speaker. After the chalk board came the slide, now in two sizes. Slides can be very effective, but more often than not simply aren't very useful. Here standards for good slides are well known and widely published but many speakers ignore all such standards. The worst phrase in medical communication is: "I must go to this or that medical meeting and read a paper." This could be better done at home by the consumer. This kind of speaker usually breaks all records for the number of characters he can get on a slide; he has 50 or more characters on a slide and only plans to show one or two things. He leaves the slide on too short a time and he mixes up the order by going back and forth and usually speaks directly to his slides instead of the audience. The Japanese have solved some of this problem at their meetings. No one may show anything but a 2 x 2 or 35mm slide; he must bring his slides to the meeting several hours in advance and a technician runs them though a projector to check their order, after which they are placed in a cartridge, sealed, labeled and delivered to the projectionist. The American College of Physicians has attempted some standardization by sending all speakers a sample slide to show size of characters needed and also by sending all speakers some advice on how to give a talk to a large audience. We are somewhat encouraged, but the progress is slow. Incidentally, the cost of having two kinds of projectors in each of four lecture rooms runs into a considerable sum of money.

Many useful slide demonstrations with textual material are available for individual study. The need for standardization here is apparent to anyone who tries to find such material. There should be one central catalogue for obtaining such material.

Motion Picture Film

Sixteen millimeter movies have been available for a long time but haven't been used as widely as their quality merits. Several years ago, a high school physics course was made utilizing 16mm sound movies. Professor White, a master teacher, gave the demonstration lectures. These children learned as well and and in many instances better than those in courses taught in the traditional way. One interesting sidelight was that the pupils really didn't need a teacher around to answer questions. The bright students answered them. Movies have one great advantage in being able to speed up action in time lapse photography and also to slow down action. They have the further advantage of being available for repetitive showings. The biggest and about the only disadvantage is the cost of good films and equipment to show them, especially on an individual basis and the somewhat cumbersome and bothersome details of operating.

The 8mm movie and now the super 8mm film should have a very great impact. The single concept film shown in cartridge operating equipment has been likened by McLuhan to parallel the rise in use of the printed book after two thousand years of manuscript culture. It seems to me that here is an instance where standardization of the use of 16mm film several years ago would have hindered progress. It is possible to make prints in the 8mm film from 16mm and even 35mm film. The biggest need for standardization in the film area is an adequate cataloguing of available films. It would seem some central agency should take on the job of listing, evaluating and coordinating the distribution of all audiovisual materials. Specialty societies could serve a useful role in providing experts to do the evaluation.

Audiotape and Videotape

Here the variety of available material is great. Too many tapes are incompatible in more than a limited number of projectors. Videotape is especially hard to use widely. This, however, is changing rapidly through the combined efforts of a number of medical centers which use videotape. Another problem with videotape is the difficulty which arises when a live television presentation is taped for later distribution. In general, it is much better to make the videotape for the specific objective from start to finish. In this way, editing is done by redoing parts of the program during production so the finished product is just the way it is intended.

Audiotape is an effective tool. It is especially useful in making information available when the physician cannot be watching a program. A good example is the use of Audio-Digest tapes in the automobile. Tape recorders are now so advanced that inexpensive ones can be purchased which use cartridges and run on batteries. Here there is quite a bit of standardization which has been developed by the wide use of tape recorders in many fields other than education.

Radio and Telephone

The two way radio programs so successfully produced by the Albany group could be duplicated more widely. This is an ideal method for presentation to groups such as hospital staffs.

The dial access telephone information centers are a useful tool especially for individuals and represent the use of a standard piece of equipment available to all physicians—the telephone. Computer developments will probably supplant this in time.

Television

This should become a much more important tool. One of every three Americans has a television set. The limitation of television relates to the need for scheduling the programs at a set time. This in itself is self-defeating for the individual consumer who has great difficulty scheduling his time for learning.

The invention and production of E.R.V. can be expected to solve this problem. Although expensive now, it will offer a way of putting out in a standard cartridge a great variety of visual materials which can be shown on the individuals own television set. This instrument will make films, still photography, and videotape all available in an easily accessible form.

8

Computer Assisted Education

The developments in this field are just beginning to be recognized and appreciated. It is easy to predict that within a short time every doctor will have a terminal in his office or home. This will make possible not only information retrieval on an almost instantaneous basis but also it will make possible many ways in which the physician will be assisted in history taking and coordinating the physical signs and laboratory results to diagnose and treat his patient. The computer-assisted programmed learning and self-testing will improve the ability of the physician to be brought up to date at an enormously increased rate.

The Place of Regional Medical Programs

One thing RMP is already doing is to gather information and encourage the exchange of various new plans in continuing education. In June of 1969, information about some of the funding became available. Dollar investment is in three categories: (1) Total DRMP investment, (2) Other than DRMP invested, and (3) The amount of equipment costs as a portion of the total investment.

Audiovisual Investment	Continuing Education	Demonstration & Training	Total
DRMP	$12,752,430.	$8,426,339.	$21,178,769.
Other	1,557,269.	174,834.	1,732,103.
Equipment	1,895,181.	2,063,782.	3,958,963.

Totals by media:

Medium	Continuing Education	Instit. Reached	Demonstration & Training	Instit. Reached	Total
Radio or Telephone	$ 2,170,539.	320	$1,693,821.	12	$ 3,864,360.
Television	2,055,823.	170	504,044.	--	2,559,867.
Computer-Based Systems	2,989,573.	14	4,429,872.	4	7,419,445.
8mm. Single Concept Films	145,943.	40	---	--	145,943.
Dial Access Audiotapes	112,121.	--	---	--	112,121.
Learning Centers	839,556.	13	---	--	839,556.
Information Centers	485,754.	--	751,870.	--	1,237,624.
Multimedia Proj.	3,115,430.	65	1,046,732.	32	4,162,162.
Libraries	824,917.	1	---	--	824,917.
Audiotapes	12,774.	--	---	--	12,774.
GRAND TOTALS	$12,752,430.	623	$8,426,339.	48	$21,178,769.

The way in which DRMP was established furnishes an outstanding example of a deliberate attempt to get away from standardization. The whole emphasis is to approve locally inspired programs in a great variety of situations. To date, the most successfully launched programs have been in those regions with one medical school in one state. Whether this trend will eventually limit the effectiveness of the program is certainly possible. Government funding which can be enormous can also change very quickly in an opposite direction. We should all seek other sources of funds from industry, foundations and from the consumer.

Summary and Conclusions

1) There is a great need for more information about availability of audiovisual materials.

2) Probably a center for continuing education such as the Lister Hill National Center for Bio-medical Communications utilizing audiovisuals will be necessary and desirable.

3) No matter what audiovisuals are used, more attention should be given to a precise definition of the objectives of their use both from the producer's and the consumer's standpoint.

4) Materials should be planned with more attention to their use by individuals or by groups.

5) Much more effort should be put into producing, from whatever original source, a standard, easily used product such as is being promised by E.V.R.

STANDARDIZATION – THE MANUFACTURER'S VIEWPOINT

Richard H. Bell

It's a pleasure to be here for this meeting.

This question of standardization is one that very frequently comes up in regard to video tape recorders and particularly one type of video tape recorder against another one and so on. I am very happy to be on this program to try to clarify a little bit the situation and the way it looks from the standpoint of the many manufacturers of video tape recorders.

In the first place, let's make clear that essentially there are two categories or types of video tape recorders. One is the professional broadcast type of video tape recorder and that is standardized. It uses a 2 inch tape, it has a standard speed, it's a quadraplex machine or a transverse scan. All professional or broadcast recorders are compatible and the tapes are interchangeable from one to the other. This is due largely to the fact that there is a federal agency with jurisdiction over broadcasting, namely the Federal Communication Commission. They can insist upon certain standards for the broadcast industry, and it's to the industry's advantage to have that, so the problem does not exist with the professional broadcast machines, and a good many medical schools do have these 2 inch quad machines because they are the finest in terms of quality and in the past have been the only color machines. So when you have or if you have the 2 inch machines of the quadraplex type professional broadcast machines, then there is no problem

The other kind is the lower cost video tape recorder using what is called the helical scan technique. It wraps the tape on an angle around the helix or round drum. These are lower cost, more portable, and come in a variety of shapes, sizes and formats. Today, I think there are about 30 different formats put out by over 15 companies, and they are all incompatible. No machine tape of one brand will play back on the helical scan machine of any other brand, so this, obviously, poses a particular problem for the educator. You probably know many of the brands. There is Ampex, Sony, Panasonic, Concord, IVC, at the latest DAVI and NAVA shows there were several new brands, and everyone who comes up with a new video tape recorder always comes up with a new format. This, I wish, were not the case. It would be easier for all of us if it weren't, but the fact remains that it is. That is the situation. The differences are not easily reconcilable. In fact, I think it's impossible to really come together with any combination of equipment that would play more than one machine such as was done with the record player back in the days when they first came out with the 33-1/3, the 45, etc. They finally built a record player that would accommodate them all. There is no way in which you can do this with video tape recorders because of the difference in tape with the difference in the speed with which the tape goes through the head, the difference in the writing speed (that's the relationship between the tape and the revolving head) the difference in the way the tape is wrapped around the helix, etc. So, we have a problem situation there that perhaps is like the airline pilot that announced to the passengers that he had good news for them and bad news. The bad news was that they were lost, but the good news was that they were making very good time.

We are in a similar position, I think, in this field. The technical development

Richard H. Bell, Ph.D., *Corporate Education Counsel, Ampex Corporation, Redwood City, California*

is going on very well. We are making very good time but there seems to be little or no attempt to standardize in helical scan tape recorders. Well, why not? Why doesn't somebody do this? Well, the question is, who is to do it? There is no agency in the Federal Government that has any jurisdiction over the manufacture or use of equipment when it does not involve broadcasting. The question is, why doesn't the industry itself standardize? Well, the situation there is if industry would get together and agree on a single format, it would mean first and foremost that one company would have to license anybody else who wanted to manufacture it because of patented rights, etc. One company has one kind of format. If that were adopted, then everybody else who wanted to stay in the business would have to be licensed or get permission from that company to manufacture in their format. Most companies are unwilling to agree to adopt anybody else's format, because most of them think that their own has certain advantages. There are also lawyers who have informed me that this might be considered in restraint of trade. Now, I don't think this would be that big of a problem, but there are legal complications to it. I think in essence what it amounts to, though, is that industry is not in a position to standardize although they would admit that the market would be clarified, the situation would be much better, and the market for the equipment would undoubtedly grow if there were standardization. Associations that have an interest in this field, such as FMPTE AND I, Tripoli and EIA have spent some time talking about this. Various electronic associations have been unwilling to arrive at any recommendations, which is all they really could do. They could recommend to the industry that they standardize on a given type of configuration for these machines, but the industry would not have to follow along because these organizations have no power to enforce different kinds of approaches unless it were a question of a really inferior or dangerous product and none of these is that much inferior. Each one claims that his product is better than the other, and in actuality each of them has certain advantages. So, what it boils down to, I think, is the fact that any standardization that is going to come about is going to have to be brought about by the consumer, and in this case by the educator or the medical educator, and this is what we have been consistently urging the educational groups to do. This has been done in an increasing number of instances where there is an educational organization or institution with any kind of authority even to recommend they have studied the situation and recommended one type of recorder to serve as their standard. We did this at the University of Colorado about six years ago now, at least. We made a study at that time and it was simpler. Then there were only four different machines on the market, and we had all four of them in our shop. Our engineers spent a week working with them, and then we made a report in which we recommended to every educational institution in the State of Colorado that they buy, in this particular case, Ampex. We adopted a standard.

The State of New York has issued a statement that they cannot find a better format than the Ampex and hence is standardizing it for their educational institutions. Other state departments of education have recommended to the schools in their states that they do go to a certain standard. As the number of machines of a given type grow, then there is more and more reason for getting that type in order to have the compatability of exchanging. So, the ultimate responsibility lies with the purchaser and the decision on helical scan video tape standardization is going to be made in the market place. I think there will be a reduction of the number of formats. I don't foresee that it will ever boil down to one. I think that in the future, there may be only three or four formats, perhaps three basic formats, one with 2 inch tape, one with 1 inch tape, one with quarter inch tape.

I would recommend to people in the field of medical education to attempt to bring this about on a state basis or an interstate basis. Reach some agreement because otherwise you do have a tremendous problem in exchanging your material. You can do this by analyzing the various machines, by looking carefully at the needs you have, and then see which machine best suits these needs, because there are differences in the machines, and the way in which you are going to use them should dictate which model you would be interested in getting. Look carefully at the existing population of the machines. How many machines are there in the area that you are dealing with—geographic or through an association? Who has how many or what kinds of machines? And, incidentally, if you come up with any of this information, many people would be interested in the result of it because this is an open question. Some surveys have been done in the field of education. Northern Illinois just completed one last fall, and gave us some idea of what percentage of machines of which brands were in formal education, but this did not just deal with medical education. I think this would be a good thing for one or another medical education organizations to do. I would recommend that you consider all the alternatives, not just video tape while you are considering these different advantages of different kinds of equipment. There are many things for which the 8mm cartridge is better suited. You also should look at and consider the possibilities of EVR, which is a new device that may have an impact. Frankly, at this point, it's easy to say that it also may not, because of the mass duplication as the point at which its greatest effectiveness and efficiency comes into the picture. If you are reproducing large number, then it is cost competitive. If you are only reproducing a few copies of something, film or video tape is still cheaper. Also, it is not a production machine. Once you have produced something, either on film or video tape, you have to put it in EVR format to distribute. So, then, look at what it is you are going to be doing and then determine what type of equipment you are going to need with standardization very much in mind, with the understanding that you do need standardization in order to be able to exchange the learning materials that go into the machine. We are only in the so-called "hardware" business, and I would certainly want to emphasize that it is what goes into the machine that is important. It's reminescent of a university that built a huge new library, and, of course, the board worked on it, the architects worked on it, and finally when they got the building completed, they realized they needed to have some nice saying to be carved in stone over the entrance. So for the first time they went to their chief librarian and said, "What will be put over the door?" And he said, "I'll tell you what you put over the door. Just say 'This is not the library. It's inside.' " And the same is true of the equipment we make. The learning material is what is important, and it's got to be exchangeable if we are going to have maximum use of it.

I would add only one suggestion in regard to the duplication and distribution of material. Remember that if you get good visual learning material produced in any format with today's technology, it can be transferred to any other format. If you have an excellent film, it can be transferred to video tape with practically no loss of quality, and similarly, if you have an excellent video tape, it can be put on film. But do keep in mind in the production of material what its major use is going to be in terms of the display device, because there are technical and psychological differences between watching a television monitor and watching a large screen, and you produce the material differently. The approach you take is different, and the techniques you use are different, so you should know which format you anticipate it is going to end up in for distribution.

That in a nutshell is where we stand in terms of the standardization of helical scan recordings.

Let me add one recent development; we don't have too much information on the story that the Japanese may be standardizing on one format. They have apparently been working on it under the urging of their government, and I understand that some of the major Japanese manufacturers are interested and perhaps are close to reaching agreement. We don't know what kind of standard it would be, or when it would come into effect, but I think you should be alerted that there is the possibility in the future of the standardization of all Japanese brands. This would still leave about a dozen European and American brands that would not be compatible and by far the majority of the machines in the educational field today, I could say in passing, are Ampex. Thank you very much.

STANDARDIZATION – THE MANUFACTURER'S VIEWPOINT (THE FAIRCHILD EXPERIENCE)

Mel Waterbor

Recently in New York, we introduced three new 8mm sound, motion picture systems. They are built on the Fairchild Experience. Yet Fairchild Camera and Instrument Corporation announcing new products is not what we will discuss today. I'll talk more about our recent announcement in a moment but first, let's take a brief look at some of the industry precedents established in the short successful life of 8mm sound. To begin with, we have 8mm film at times somewhat confusing in the past. There is Regular 8, and there is Super 8, introduced in 1965. While the film stock for these formats are identical, the similarity ends there. The sprocket holes, frame area and ratio, and sound position are different. As if that lack of identity was not enough, there is magnetic sound: sound recorded electrically on a magnetic strip on the film. And there is optical sound: sound recorded photographically on a film track.

In addition to confusion due to differences of film format and method of sound recording, variation in picture-to-sound separation added still more confusion. In order to accommodate the first practical instant loading sound 8mm cartridge projector, Fairchild selected a separation of sound placement of minus 28 frames. With the introduction of Super 8, varieties of picture-to-sound separation increased with minus-28 frames being joined by plus 18, plus 40, plus 125. Meanwhile, proponents of optical recording had sound standardization problems of their own. Width of optical track was confusing as various specifications developed; track widths ranged from 17 mils., to 20 mils., to 22 mils. Already technically marginal, sound quality degenerated with further loss resulting from mismating of record and playback dimensions.

Another important influence that did nothing to reduce the confusion in the industry was the lack of standardization in film cartridge configurations. A wide variety of non-compatible cartridges reached the market. Among the cartridges introduced were Fairchild's own MoviePak 10, MoviePak 20, Technicolor, MPO, Jayark, Bohm-Benton. The result? Confusion: Because one manfacturer's cartridge would not fit any other manufacturer's projector.

Yes, there has been a long list of precedents with varying effects in the market place. Today there are a few events that could be considered unprecedented in 8mm. One such unprecedented action would be agreement by a meaningful group of equipment manufacturers to adopt overall format compatibility. That is, to standardize.

Fairchild pioneered the 8mm cartridge sound industry. From the beginning, we have urged that standardization would have to be achieved if 8mm were to come of age. Before 8mm could gain universal acceptance in the educational world, in industry, in government and by the consumer, there would have to be standardization.

The industry is now almost ten years old. On the threshold of its second decade. As the world enters the decade of the Seventies, it is appropriate that we mark it with a milestone. The milestone we announced involves standardization and

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Mel Waterbor, *Marketing Manager, Education and Audiovisual Systems and Services, Fairchild Industrial Products, Plainview, New York*

what Fairchild is doing about it. To start the second decade of 8mm sound, Fairchild has introduced two new lines. New systems for the Seventies. As you will soon see, we have taken a number of steps toward standardization for Fairchild and the industry.

Our standardization starts in the most basic area, film format. In the two product lines, we have adopted a single film format which we have reason to believe will find international acceptance in the 8mm sound film industry. We believe standardization means Super 8 film, magnetic sound and an image-to-sound separation of plus 18 frames. Many of you familiar with the details of the industry will realize the impact of that last point: Fairchild standardizing at magnetic plus 18 frames.

The overwhelming bulk of cartridge sound motion picture equipment in the United States today is Fairchild. We estimate that we have over 85% of the market with hundreds of thousands of cartridges, and tens of thousands of Fairchild projectors already in the field. Projectors like our Mark IV rear screen MoviePak cartridge projector in Regular 8 and Super 8 and our Mark V front screen companion projector to the Mark IV.

Fairchild's MoviePak system—by far the greatest part of existing equipment on the market—employs the minus 28 frame picture-to-sound separation. We expect to continue to produce and service 28 frame equipment for many years to come for customers who have programs already in existence. But—and it's a big "but"—all the equipment we introduce today—our new systems for the Seventies will standardize on Super 8 magnetic sound, plus 18 frames separation.

It's a major step for Fairchild, and if you're wondering why, there are many impelling reasons behind our decision. As I stated a moment ago, Fairchild has stressed standardization with the industry. For us to standardize on plus 18 frames for cartridge projection was somewhat involved from a technical point of view. But it became apparent that our chief contribution toward standardization could best be on an engineering basis. It would be easier for us to be the catalyst and to provide a bridge between the several approaches than to insist that others move 100% in our direction.

In moving to plus 18, we are not adding to the confusion, but reducing it. We are not proposing a separate path. We are not alone in following it. The plus 18 frame Super 8 magnetic standard was first proposed by a not-familiar company—Eastman Kodak. Some of you may have attended Eastman's press conference. They introduced new 8mm equipment for the consumer market. Then, as they have on numerous occasions during the past year, they underlined their feeling that the answer to high quality, high quantity Super 8mm release printing resides in sufficient processing with magnetic recording and that the desirable image-to-sound separation is plus 18 frames. Their current Ektagraphic projectors adhere to that standard and the new EK cassette family has been designed for full compatibility with it.

Eumig, of Austria, has taken the same path, Fairchild in combination with Eumig and Kodak, each company the biggest name in its market. Each publicly adopting Super 8, magnetic sound, and plus 18 frames! This represents a very important step—A signpost on the path to film format standardization. It's not talking, it's doing; doing something that's long been necessary in our dynamic industry. We anticipate that other manufacturers will adopt this same film format. In a relatively short time, we see this approach to standardization achieving its goal and resulting in a true mass-volume market for many manufacturers making compatible equipment.

What about the tens of thousands of Fairchild projectors now in use? Units manufactured during the past five years? Units minus 28 frames sound separation? As briefly indicated before, the question actually answers itself. They are in use today. In many cases, they've been in use for two, three, five years. And they'll continue to be in use tomorrow. There will be continued availability of the Fairchild Mark IV and Mark V projectors for the foreseeable future. Current users, particularly industry, will continue existing programs with these highly reliable systems. Firms like AT & T, Mercedes Benz, Career Academy and American Medical Enterprises will continue current programs. Programs like the one announced recently in the New York Times by Chelsea House Publishers will be expanded. Almost all of our customers with major programs were notified well in advance of our intention to introduce new equipment with plus 18 frames standardization. Yet, the current and available proven Fairchild equipment fulfills their specific requirements. And they, and many other accounts, are going full steam ahead.

The dentist in his office or the computer training specialist in industry, with one or two projectors per installation, is not in any way as dependent and involved in standardization as is the government agency procurement officer or the school administrator. To emphasize the point, I'd like to underline a press announcement made recently. It provided details of an agreement whereby $1.3 million worth of Mark IV system equipment was purchased from Fairchild. It represented, as that announcement said, the largest single contract entered into in the history of 8mm cartridge sound. The customer placing the order was Professional Research, Inc., a division of American Medical Enterprises. To repeat, they were well aware that we intended to come out with new models and a new film format when they placed their latest and largest order for current equipment. We believe that new programs, with new applications for new and expanding markets, will be made with Fairchild's new equipment. Important to industry and medicine, but almost mandatory to government and education, standardization will result in production of new film materials and new and expanded programs; programs that will standardize on a film format of Super 8, Magnetic Sound, Plus 18 image to sound separation. Today, we are on the threshold of a new decade; the second decade for 8mm sound. But for the sometimes troubled world, a decade of hope for peace with communication.

INTRODUCTION OF PANEL

Robert S. Stone

In this session, we expect to learn about two applications of closed circuit television in basic laboratory science instruction. The first of these is in the context of a specific undergraduate course on a high quality but rather modest scale. This is in contrast to the second presentation which describes an expensive highly professional installation and organization servicing the integrated curriculum for basic science teaching in a medical and a dental school. General classroom and self-study carrel modes of use are offered.

Following this we expect to be introduced to a new device which shows some most interesting possibilities—computer assisted type of instruction—increasing the capability of us all by relieving us of dependence upon enormously expensive general purpose computers. Our last panelist will take up some philosophical considerations relative to the use of audiovisual material in medical education and will make a deceptively simple sounding suggestion about how we might organize available material to make its use far more generalizable. He will illustrate his point in the context of instruction in gross anatomy.

Robert S. Stone, M.D., *Director of Postgraduate Institute, The Fenway, Boston, Massachusetts*

TEACHING MICROBIOLOGY BY CLOSED CIRCUIT TELEVISION

William G. Walter

A recent publication *The Teaching-Learning Paradox—A Comparative Analysis of College Teaching Methods* (Dubin and Taveggia, 1968) indicated that the authors were unable to claim superiority for any among different teaching methods used to convey subject content to the student. However, numerous studies have demonstrated that students can and do learn as well from classroom television as from conventional instruction, but Instructional Television (ITV) has not achieved a central position in education. Two reasons for its limited acceptance have been closely related to the quality of transmitted instruction and to the way it is used in the classroom. Nevertheless, the ever increasing number of students, the frequently inadequate facilities, and the dearth of good teachers have forced many institutions of higher learning to investigate the television medium as a means of meeting some of their educational demands. The late Lynn Kalmbach, director of South Carolina's ETV Center, indicated that success or failure in an ITV project often depends on "sweating, maneuvering, politicking." He advised that those desiring to get into the field find a successful program in existence and then modify it to their particular needs and resources (Murphy and Gross, 1966).

Pennsylvania State University was one of the first institutions of higher education to offer campus TV courses for credit. Other American colleges and universities have followed suit. Robertson (1969) has used closed circuit television (CCTV) since 1962 in teaching engineering at the University of New South Wales, Australia. At Montana State University the Department of Film and Television provided CCTV facilities for courses in nursing and chemistry in 1962.

Our department first used CCTV in 1965 for a well-established four credit lecture-laboratory course having no prerequisites and entitled *MICROBIOLOGY IN RELATION TO MAN*. This course is taken by approximately 890 students each year from all classes and curricula at the University. The students meet for 50 minutes 5 days a week in two specially designed laboratories each equipped with 3 TV monitors (Fig. 1) and accommodating 36 and 40 students respectively. (These rooms are also used for other microbiology lab courses.) Each student purchases a textbook and an outline-workbook which is followed closely each period. Microscopes for each student and all necessary laboratory supplies are furnished. The logistics of clearing laboratories and setting up for the next class in the 10 minutes between periods require careful planning, rapid manipulation, and good organization.

The principal instructor operates from the TV studio about two blocks from the laboratories. The first period of the day is a "live" presentation which is video-taped for two, three or four subsequent periods depending on the enrollment during a particular quarter. In order to aid the instructor in adjusting his speed of presentation two different students acting as "pacers" come to the studio each period and participate in discussions and demonstrations for the TV production. They also take notes and do lab work as if they were in the classroom during that period (Fig. 2).

William G. Walter, Ph.D. *Head and Professor, Department of Botany and Microbiology, Montana State University, Bozeman, Montana*

Four undergraduate students majoring in the Department of Film and Television operate the two Image Orthicon (Visual Electronics, Co.) cameras, direct the program and operate the master control board. Unfortunately the same four students are not always available each day, but their efficient performance has been most gratifying. Most of the technical problems concerning equipment in the studio and labs have been handled by full-time engineers.

Busy schedules for instructors and studio crews as well as limited studio facilities prevent any extensive rehearsals before class. However, an attempt is always made to inform the director of any unusual short or special activities to be covered during the period. A few "warning" words in the general lecture prior to performing a special technic alert the director and cameramen and then deliberate movements allow them time to get good shots in most instances.

One instructor has the prime responsibility each quarter for all phases of this course and does most of the lecturing. The other six microbiologists in the department participate in one to several periods each quarter in their specialty. This team approach is often considered by the students to be one of the best features of the course.

At some institutions having large classes or using TV, the criticism has often been voiced that there is little or no contact with the instructor. In the present course, there is always a staff member or a graduate teaching assistant present in each lab who gives instructions, leads discussions or answers questions in time allotted from the TV presentation at different times in the period. In addition a senior majoring in microbiology who is registered for a 3 credit course in microbiological teaching is also present. This student serves as a lab assistant, helps in preparing and grading exams and functions admirably as liaison between students and staff.

Since this is an elective course for many of the students and they have registered mainly to obtain 4 credits of a laboratory science without necessarily having any special interest in biology, numerous approaches have been used to get attention at the start of a period. Frequently music is played between periods or a news broadcast is presented for several minutes before the bell. On other occasions a few scenes from a previous "Laugh In" presentation, a spaceship blast off or landing or some other current event or sports highlight, previously taped, may be shown. Visitors, not always microbiologists, or some individual associated with a special campus event may appear briefly. Such activities provide a variety to the class greatly appreciated by the students.

During a typical class the TV presentation may involve most of the period for lecture, or may include some lecture, some demonstration and then time for microscopy, inoculating, staining and other lab work frequently included in introductory courses. It is not expected that students will become proficient in lab procedures but a much greater appreciation of the microbial world is obtained when lab work is included even in such an introductory course. For many this is their first biological course, their first opportunity to use a microscope and to observe activities of an hitherto unseen world.

Films and slides are frequently inserted during the period to elaborate on such points as microscopy, fungi, water and sewage treatment, diseases and virology. On other occasions tapes previously prepared by taking the TV equipment to the site of the electron microscope, germ free units, animal quarters where inoculations are demonstrated, and laboratories where tissue cultures are prepared permit all students to see activities which could not be viewed individually in the respective laboratories. Such video tapes are kept and replayed for several quarters thus saving time and effort of the staff.

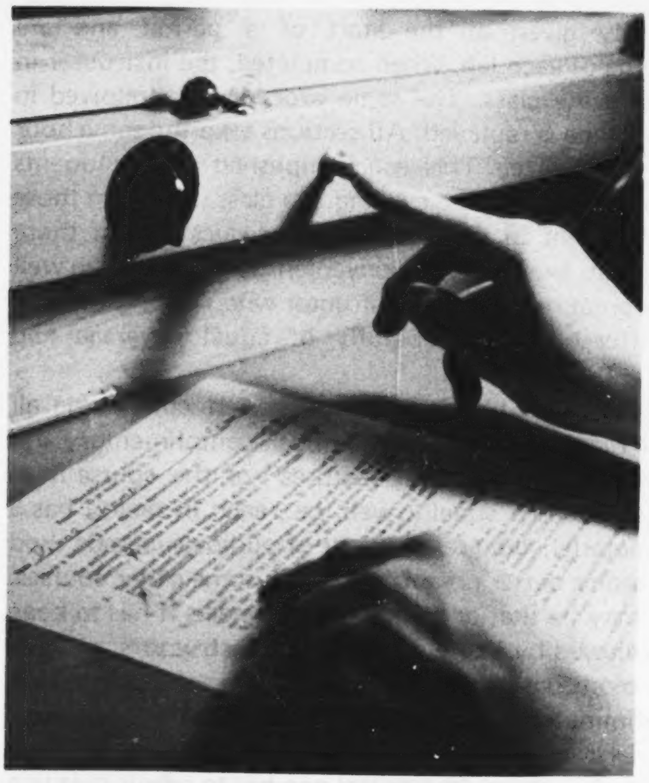
Several instructors consider the overhead G.E. television camera with a zoom lens to be the most useful instrument in the studio (Fig. 2). This equipment is operated by the instructor and allows him complete control in showing pictures from textbooks or journals, in demonstrating technics and in viewing preparations through the microscope.

Short quizzes are frequently given at the start of a period and are administered by the person in charge of each lab. When completed, the instructor in the studio is notified and he starts the class. The same procedure is followed in subsequent periods when the video tape is replayed. All sections take the same hour exams given three times during the quarter. This is accomplished by all students meeting in a large lecture room at 5 p.m. or in the evening. No class is held on those days but one if the assistants is present in the lab to answer questions of those desiring extra help. A common exam, even at an inconvenient hour, has been well accepted by students. It is also a great relief to the instructor who no longer has to prepare three, four or five different tests–hopefully of equal coverage and difficulty.

At the end of the quarter student opinions are requested concerning all phases of the course. To date the reactions have generally been complimentary and most helpful in modifying certain parts. The "best features" of the course have most often included: all can hear and see equally well, i.e., each in reality has a front seat, all receive the same material; the great variety of audiovisual aids used maintains interest; and the class seems better organized than in some other courses. Reasons for the latter comment may be that once the TV class starts it has to keep moving and the presentations are viewed by many including the instructors' peers as well as administrators who have monitors in their offices. The "weakest features" of the class have largely been eliminated with each succeeding quarter but have included: not enough lab time; lack of personal contact with the instructor; and can't ask questions at the moment of concern. In rebuttal one has to admit that in a course of this type there will seldom be sufficient lab time during a 50 minute period for the slower students. To help alleviate this, one lab is open for certain hours to make-up work and an assistant is generally in the vicinity. To increase the student-instructor contact is sometimes difficult because of many other commitments by both groups. One instructor's approach has been to keep the TV presentations quite informal, to visit the labs as often as possible, to conduct review sessions before the hourly exams and the final exam, and to maintain an open door to his office which is located adjacent to one of the labs.

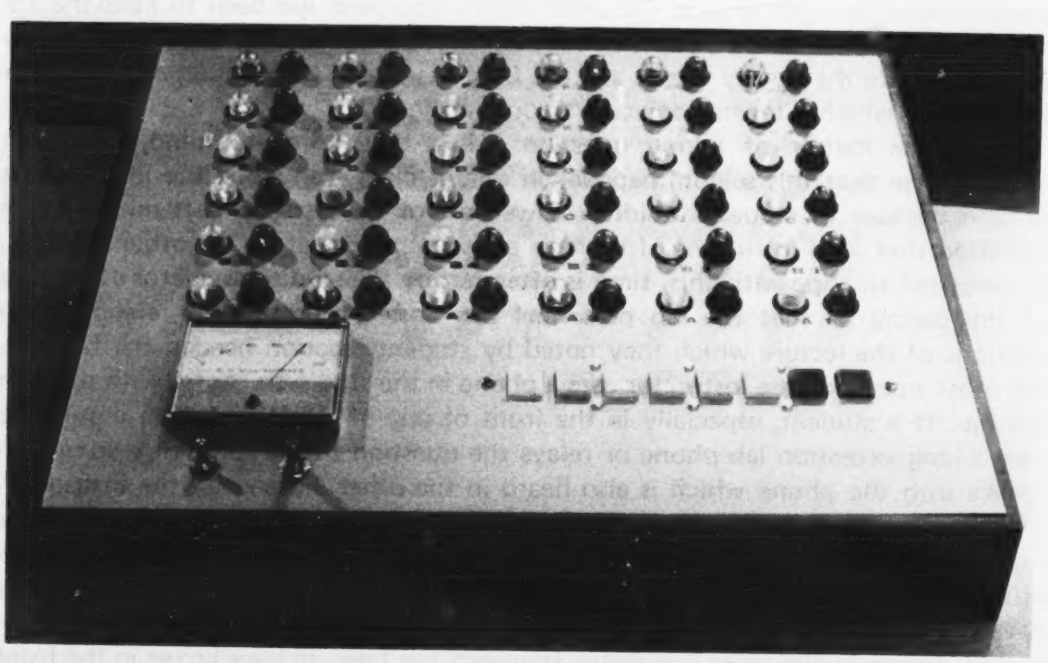
In the matter of asking questions when they come to mind, one must acknowledge that this seldom happens in a large class even when the instructor is present because of student timidity as well as for other reasons. It must also be admitted that such intrusions often have a disrupting effect on the other students. In an effort to cope with this, time is often left by the studio instructor at the end of the period so that the lab personnel can answer questions or elaborate on portions of the lecture which they noted by student reaction needed clarification. On other occasions the instructor uses a phone in the studio to confer with those in the lab. If a student, especially in the front of one of the labs, has an inquiry he uses a long extension lab phone or relays the question to the assistant who in turn speaks into the phone which is also heard in the other lab and by the instructor. The question as well as the answer is taped and hence appears at later classes on the replay. This system doesn't enable students in subsequent classes to pose questions but they have the benefit of the previous replies. The studio "pacers" sometimes have questions or are primed with some which are considered any time during the period. Recently the most successful approach has been to have boxes in the front of each lab where students can place written questions, comments, etc. anonymously. These are considered at the next period or as soon as the instructor can find a suitable answer because all questions are not related to microbiology.

Figure 3



The most frustrating aspect of ITV presentations to an instructor who has taught for many years in the classroom is the absence of reacting students. The "pacers" and even the cameramen sometimes help, but the instructor is usually directing his attention to the camera lenses in order to obtain audience eye contact, or to the red light on top of the camera indicating which is on the air and hence has little time to sense the response from those in the studio. This is not a particularly rewarding experience. To overcome some of these obstacles, a Student Response Indicator (SRI) has been developed and installed in each laboratory. This consists of a switch with 5 positions and two lights, red and white, at each student's place (Fig. 3). In each lab there is a master board with two similar lights for each student's place (Fig. 4)

Figure 4



and in the studio there is a meter for each room. These are calibrated at the beginning of the period by instructing all students to set their switches in a particular position and pushing the button. This permits a percentage evaluation of responses on subsequent questions. The master board also has a meter so that the instructor in the classroom can also note the responses of his class as well as that of the individual student.

Multiple choice and true-false examinations can also be given. Presently the practice is to have the students mark the selected answer on furnished sheets (Fig. 3). After the class completes the exam, the classroom instructor depresses the proper answer button on the master board for the first question. The students set their switches to their previously selected answer number and push their button. If they choose the correct answer the white lamp lights, if not, the red lamp lights. Similar indicator bulbs also light on the master board for each location. While this information is being recorded manually on a large sheet of paper cut with holes so that it fits over the bulbs on the master board or by using a polaroid camera, the student has an opportunity to find the correct answer by moving the switch and pushing the button until the white light appears. This does not affect the first choice which is the only one recorded on the master board. The instructor then continues the same procedure for each question on the exam. The instructor knows immediately how well the class has performed and the student is aware of his grade and also the acceptable answers on questions missed.

Preliminary discussions have been held with two commercial companies that have equipment somewhat similar to the "homemade" apparatus described. Possibilities exist for transferring student's responses to magnetic tapes or through other data collection systems for computer analyses. There is also interest in developing instrumentation systems utilizing student carrels to permit individualized education and to provide for monitoring student performance so that his progress and the effectiveness of instructional materials being used can be evaluated.

In our experience the teaching of introductory microbiology by closed circuit television to large numbers of students in a lecture-laboratory situation has been quite well received. We have found that the possibilities in the many facets of ITV are limited mainly by the imagination and ingenuity of the instructor, the time available for innovations and the funds for purchasing and maintaining the hardware.

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FIGURES

Walter —CCTV

1. Microbiology lecture—laboratory classroom accommodating 36 students and equipped for closed-circuit television.
2. Student "pacers" in background. Overhead camera adapted for microscopy and instructor's monitor at left.
3. Student response indicator showing 5 position switch, red and white indicator lights and push button for recording.
4. Master board for recording individual student responses. Buttons at lower right used to set a correct answer or clear the board. Meter at left indicates percentage of class responding correctly.

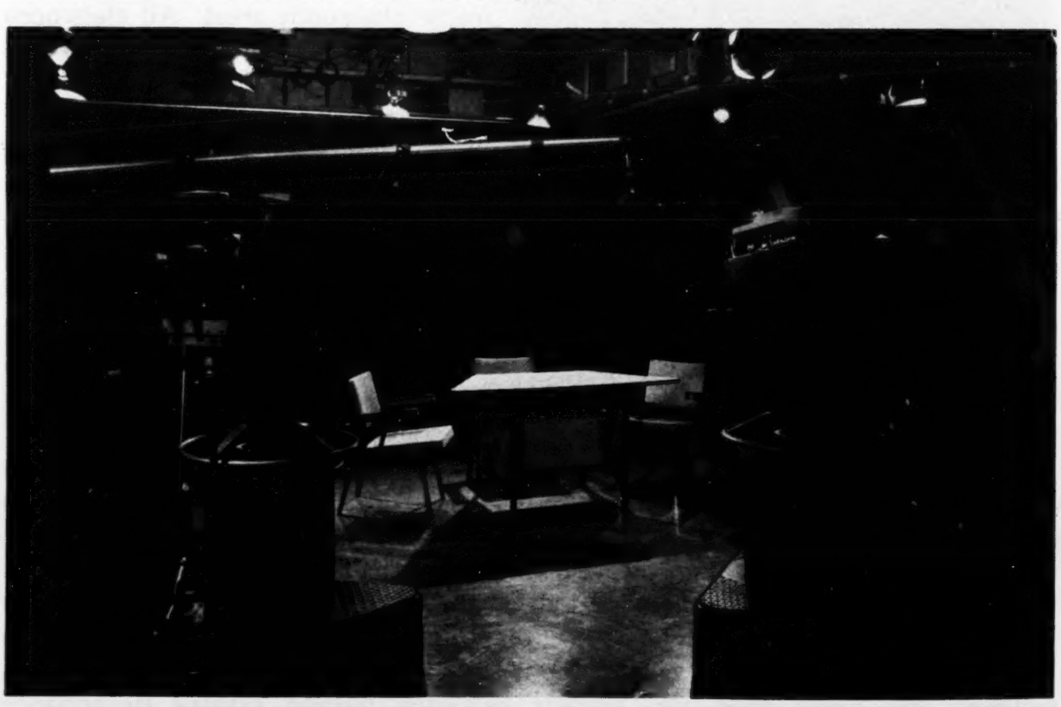
AN INTEGRATED SYSTEM FOR INSTRUCTIONAL TELEVISION, INCLUDING SELF-STUDY AND LABORATORY COMMUNICATIONS

Melvin C. Shaffer

The Medical College of Virginia, like other institutions of higher learning, has been faced with the problem of expanded enrollment and difficulty in funding new buildings and more faculty. A variety of approaches has been followed in an attempt to allow an expansion in the enrollment and non-linear expansion in facility space and faculty. One of the modalities utilized to accomplish this objective has been the College's involvement in modern communications technology. The overall objective of our communications system is to decrease the student-faculty ratio, particularly in laboratory science courses, to provide self-study materials in addition to the normal book materials in the library and to bring to the campus materials in the form of film and video tapes, which would not otherwise be available.

In addition to our own campus activity, it has been the desire of the institution to provide a learning experience for medical professionals in our area of influence in the form of video tapes for broadcast over education stations and through small video tape recorders placed in hospitals within the State. In order to provide this sort of service to the institution, the Visual Education Department has established a very comprehensive television production and utilization facility. While this paper will be concerned primarily with utilization in two areas, which are somewhat unique, a brief description of the overall facility seems essential.

Our television production facility consists of a professional studio, which includes TK-60 and Norelco PC-70 cameras, Quadraplex video tape recorders and the usual assortment of switcher-faders' special effects.

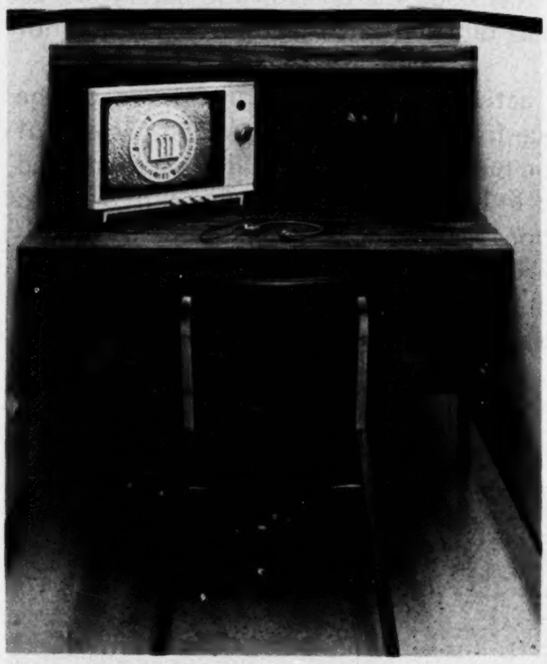


Main production facility for television at MCV.

Melvin C. Shaffer, *Director, Visual Education Department, Medical College of Virginia, Richmond, Virginia*

The studio equipment is divided between the main television production center in the Medical Education Building and the dental unit in the Dental School with interconnecting lines between the two. This broadcast facility is utilized for the production of all materials utilized within the institution and for a large percentage of the production, whether for local or broadcast use, is done on Quadraplex master tape, which is computer catalogued and permanently kept for dubbing as the need arises.

The master control room contains, in addition to the Ampex video tape machines and camera control gear, a battery of slant track video tape recorders, which are used to feed program information to a 10-channel RF distribution system and 12-channel video distribution system. A total of 15 slant track machines are available with some being used on special projects in remote areas, such as Radiology. The 10-channel video distribution system is used for self-study and laboratory communications. Dynair TX-4 modulators and Jerrold solid state distribution amplifiers are used to distribute the signal to 254 study carrels and 5 laboratories, including a total of over 250 television receivers. Thus, 10 separate requests for program material can be serviced simultaneously by the self-study area.

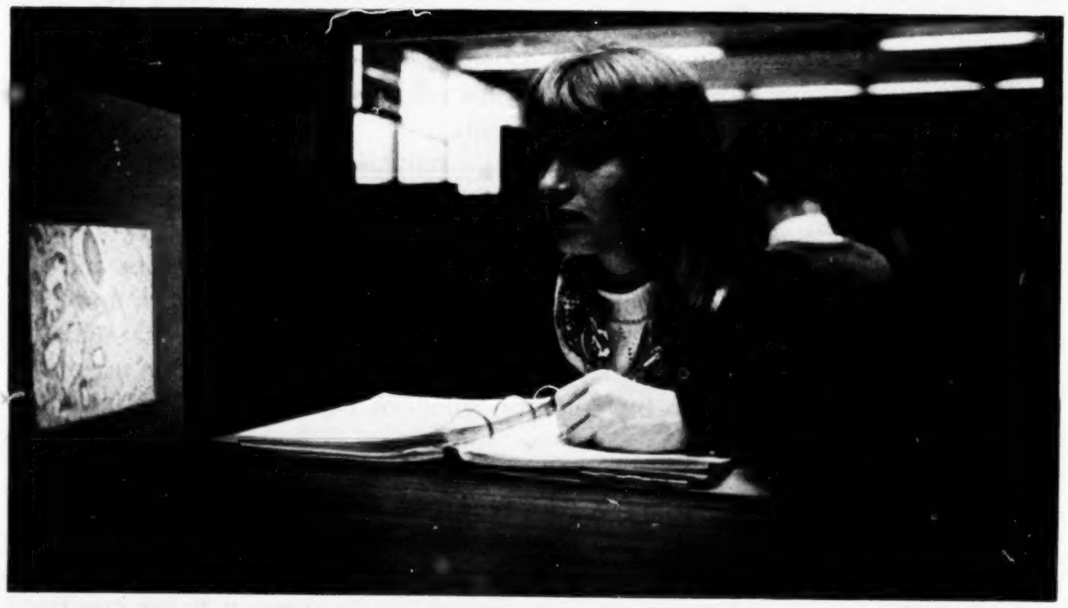

One of 254 carrels for self study at MCV. This shows a television monitor and earphones.

RF channels 12 and 13 are reserved for a service that will be described later in this discussion. The 12-channel video distribution system mentioned is a 12 x 12 crossbar switcher, which feeds trunklines to major classroom areas. All classroom facilities within the institution are serviced by this video system. The video modality was selected for classroom use because it makes possible the presetting of all television controls within the classroom and the operation of the system from a remote point.

Essential to the operation of our television system is a private telephone connecting every television installation with central control. The telephone gives the faculty and students absolute control over programming with no control whatsoever over engineering as tapes are run on request rather than on schedule.

In 1967 the National Fund for Medical Education furnished financial aid to the institution to build 104 study carrels as an experimental unit to develop utilization concepts for self-study. A considerable search and testing program was done to determine which of the many media available for self-study would be utilized in the center. We concluded that all the material in the field of medicine a student might need for study, other than books and live patients, could be presented through either of two methods, i.e., carousel slide sets with a printed syllabus and video tape for subjects requiring motion display to enhance understanding. We specifically eliminated from the center cartridge motion pictures, audio clued slide sets and teaching machines. We do not rule out computer control or computer presentation for the future.

Group of carrels in one of the rooms which constitute the Self Slide Center at MCV.



The carrel in use for viewing 35mm slides.

Additional funding was made available to us through the National Fund for Medical Education in 1968 and the self-study center was expanded to include 254 carrels—enough for permanent assignment to each student in our School of Medicine, both Freshman and Sophomore Class.

The self-study center carrels are wired with a Jerrold distribution system utilizing amplifiers, splitters and tap-offs in a configuration that gives 20,000 microvolts of RF signal per channel per set. In order for us to utilize 10 channels on the RF system, it was necessary to utilize this very high signal strength per set to override strong local broadcast signals.

Students call for tapes on the previously described private telephone system.

Small commercial television receivers are used in the carrel with no modification other than the substitution of a headset for the loud speaker and the use of shielded cable directly to the tuner in order to minimize RF pickup off the air.

Materials used in the self-study center are curriculum oriented. Students tend to want to see the same things at the same time. No serious problems have been encountered as a result of the relatively few channels available. We have avoided dial access equipment because there is no way by which the several hundred hours of material could be made available to the students on a 10-channel basis without technicians to help change reels of tape.

In our experience two rather skilled technicians are needed to operate the 10 video tape machines on a random call basis. At the present time, approximately 14% of the students' instruction in the freshman and sophomore class takes place in the self-study center.

The increasing enrollment of our student body has made it necessary to expand laboratory facilities and to attempt expansion of faculty to accommodate the increased student body. As a way of offsetting this very expensive trend, we have fitted out several major laboratories with visual-audio intercommunicating systems on the premise that fewer faculty could teach a larger number of students. Traditionally, biology laboratories have been conducted by faculty supplemented by graduate students and instructors at a ratio of 1 instructor to 10 or 12 students. Our designed criteria was to reduce this ratio to 1 instructor per 130 students.

Each of 5 laboratories was fitted out with high quality RF television sets strategically placed for viewing by 10 or 12 students and a sound system designed for the instructor's use as a public address unit for the entire area or for two-way direct talk with one student or group of students.

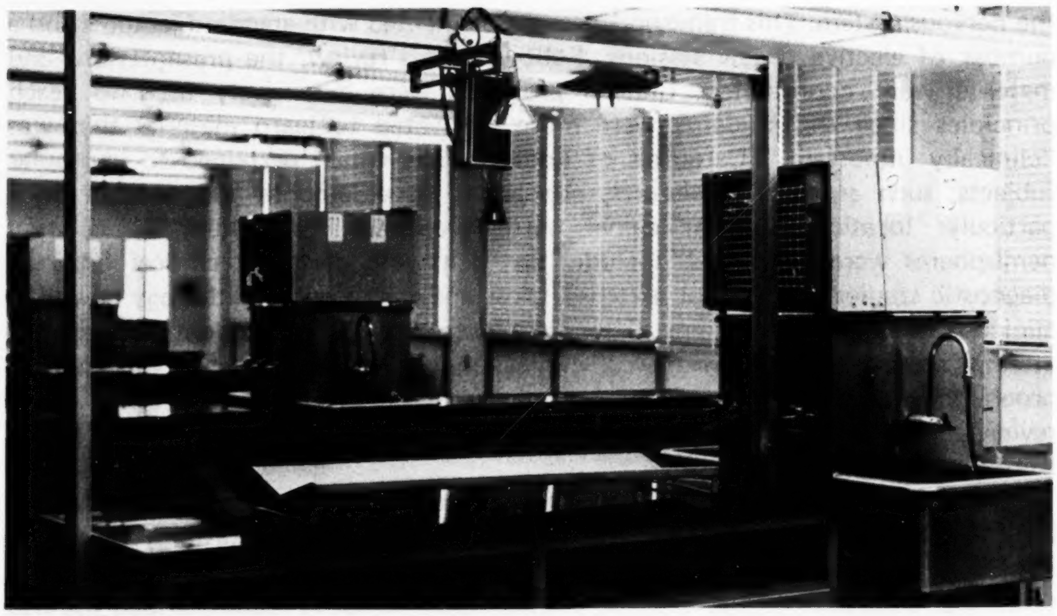
Television distribution within the lab is a standard Jerrold system that feeds channels 2-11 from central control as described previously and mixes 12 and 13 into the line within the lab.

Channels 12 and 13 are used over and over again in different labs and the simple procedure of putting a small distribution amplifier as an isolating amplifier ahead of each channel 12 or 13 insertion in a laboratory restricts the local signal to the area desired. At the present time, there are 5 channels—12 and 13 in use at the college, each being mixed into the common trunkline but isolated from it by the amplifier.

Thus to each of the 32 television receivers within the Physiology lab 10 channels of program information are available from center control and 2 channels are available from local cameras within the lab. The sound communications within the unit are accomplished through a custom-made system using a small speaker at each student location and an inexpensive microphone for students to ask questions of the centrally located instructor. A signal light is incorporated for students to signal for attention. The control configuration is such that the instructor can respond to one student or respond to all if he determines that a particular student's question might be of interest to the entire group.

This instructor-operated system insures that all students are uniformly oriented in the proper conduct of an experiment or oriented to a microslide. Thus, large amounts of time are saved in the conduct of the lab. We have demonstrated that a single instructor can conduct a lab involving as many as 130 students and he can do so with a higher level of contact with individual students than it is possible in a noncommunicating lab using multiple groups of students, each with an instructor.

The visual-audible communicating systems have been designed to be faculty operated and in no case do they require trained television personnel. Engineering



Television camera and monitor for use in physiology laboratory demonstrations.

and production personnel are not normally present in the lab when the system is being used, but are available on call if the faculty desires help.

The use of color in the laboratory has proven much more effective than black and white. It now seems possible to greatly reduce the number of hours required to teach a course and possibly to eliminate the use of microscopes and other instruments.

Our experience has shown that helical scan recorders can serve adequately for playback to a self-study center in black and white. There does not appear to be a helical machine currently available for recording or playback in color that is dependable and that produces adequate quality.

It is our feeling that helical scan video tape as a library resource is feasible in black and white but unacceptable in color.

The self-instructional program in the neurological sciences evolved from separately developed audiovisual programs in Neuropathology and Neurology. The development of the materials was partly in response to the introduction of a coordinated curriculum in the neurological sciences. Standard textbooks were found inadequate for the subject matter approach. Moreover, a dreary procession of back-to-back standard lectures indicated that neither coordination of the material nor participation by the students in their educational process was an automatic result of this type of curriculum. Furthermore, definition of the core curriculum and highly individualized training in medical school required a program with better defined objectives and more flexibility, applicability and efficiency than the standard type of lecture-laboratory course. Our objectives were to communicate a well-defined core of coordinated information about clinical problems in the neurological sciences and to provide the student with the tools and an opportunity to establish his own pattern for an educational process. While our examinations tested for the former objective only, critiques and continued contact with the class supplied information about the latter objective.

An introductory review of neuroanatomy utilized Sidman & Sidman's programmed text of Neuroanatomy since it was found to be one of the very few means by which students obtain a three-dimensional, non-fragmented concept of the nervous system. This framework was supplemented with standard lectures and a number of elective review sessions. Following this review, the presentations and material were coordinated. Clinical problems were extensively used to teach principles since the students were more motivated to learn material that was "clinically important." Carousels of kodachromes which pertained to particular subjects, such as vascular diseases, neoplasms, developmental disorders or to a particular location such as spinal cord, brainstem, cerebellum or cerebral hemispheres were assembled. Included in each were pertinent clinical findings, diagnostic studies, anatomical sketches, gross and microscopic pathology as well as clinicopathological correlations. Cases were assembled and the student was urged to attempt logical solution of typical clinical problems. The material was roughly programmed with reviews as well as quizzes at periodic intervals. Small group review sessions and hours for independent study were substituted for classical laboratory exercises.

Video tapes that demonstrated clinical entities, the neurological examination, EMG and EEG recordings were developed by the Division of Neurology. The cross section of clinical material accumulated in a central video tape library over several years was accessible to the student in this study carrel. A recommended list was given to each student and most of these selected tapes were also shown during lectures.

In order to de-emphasize grades, many nongraded as well as practical examinations consisting of tapes and kodachromes illustrating a variety of clinical entities and examinations were given throughout and at the end of the course. An exhaustive critique was filled out by the students and their suggestions for improvements were incorporated in revisions of the material.

The extensive use of self-study materials which provided a well defined core of information allowed the students to progress at their own pace. It also provided the basis for more meaningful student-faculty exchanges. Although every effort was made to teach the basic core of information to all the students, a positive attitude toward learning and problem solving in the neurological sciences was considered to be as important in the development of thoughtful clinicians as acquisition of core material. Thus, the student was encouraged to progress beyond the core curriculum to classical references and problem solving as rapidly as possible and his personal responsibility for his progress was emphasized. The faculty members (who functioned as concerned catalysts) as well as students were enthusiastic about the quality of learning which resulted from this program. The body of coordinated self-instructional materials converted a curriculum of assembled lectures into an honestly coordinated learning experience. Moreover, it was found that the materials were pertinent at several levels of achievement and could easily be duplicated. Interest in the program indicated that the principles and techniques as well as the type of materials had a broad field of application in medical education. That more medical students can learn more efficiently at their own pace by means of the study carrel with associated self-instructional materials was also established. Thus, a self-study program in the neurological sciences took its place as part of the continuing educational program at the Medical College of Virginia and served as a model for solution of some pressing problems in medical education.

A NEW APPROACH TO COMPUTER ASSISTED INSTRUCTION IN HEALTH SCIENCE EDUCATION

Merlyn C. Herrick

The University of Missouri-Columbia Medical Center is engaged in a number of investigations of the applicability of computers to health science education. Among the current projects are several information storage and retrieval applications and programs for diagnosis of radiographs and remote electrocardiograms.

These and other activities of the Medical Center are supported by an IBM System 360, Model 50 Computer with a memory capacity exceeding 500K along with both teletype and cathode ray tube input-output terminals at local and remote locations.

One of the characteristics of computers which users of experimental systems soon identify is the high monthly rental cost of the essential components. If telephone lines are used to connect the central processing unit and memory to outlying terminals, another significant cost factor results.

The economics of such a system is a major impediment to the development of operational computer assisted learning, an impediment not often outweighed by the desirable features of the adaptive self-instructional characteristics which CAI may possess.

For any form of computer-mediated learning to be practical and operational, the system must meet three criteria. The system must be sufficiently inexpensive that enough terminals can be afforded to provide a functional terminal-to-student ratio. The system must be sufficiently reliable and free of downtime that each student can be assured of having access to the system within a reasonable time span. And, third, the system must store its programs in a readily accessible manner so that each terminal can have access to all programs at any moment without scheduling. It is also desirable to have the system operational throughout most of all of the 24 hour day.

We at Missouri have identified a CAI system which meets these three criteria, which can be available 24 hours a day if desired, and which thus allows us to take advantage of the positive aspects of CAI without the negative aspects of high cost, downtime, and scheduling.

The heart of this system is a highly sophisticated yet small and lightweight device, a device that would have been called a teaching machine a few years ago. Unlike the old teaching machines, but like a computer, this device has capabilities that extend well beyond automated page turning.

The machine has three basic capabilities. First, like a computer and the few teaching machines that have survived, it can be an automated page turner. Within this capability, the machine can present linear frames in sequential order, or it can present frames in a branching sequence depending upon the answer choice made by the learner. In this mode, a learner has the possibility of five answer choices marked A through E. However, by applying a little ingenuity, a programmer can categorize answers thus producing up to 25 possible choices, or by further categorization produce up to 125 possible choices. In other words, although only five choices are

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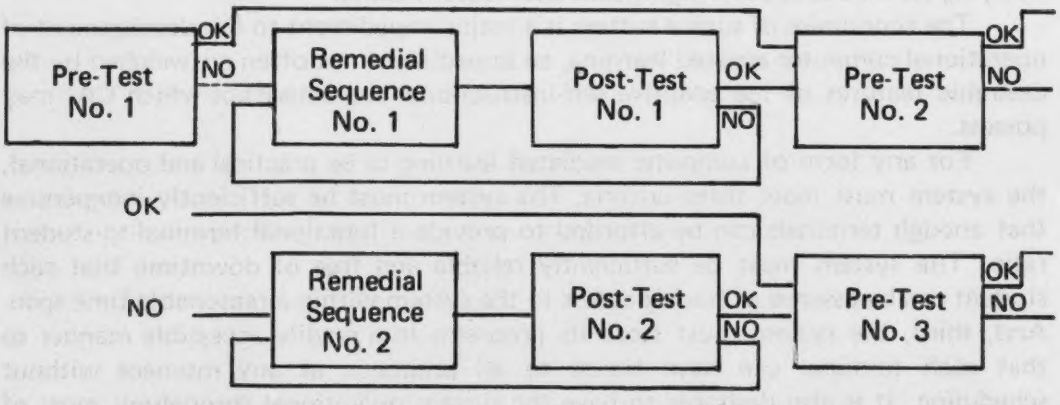
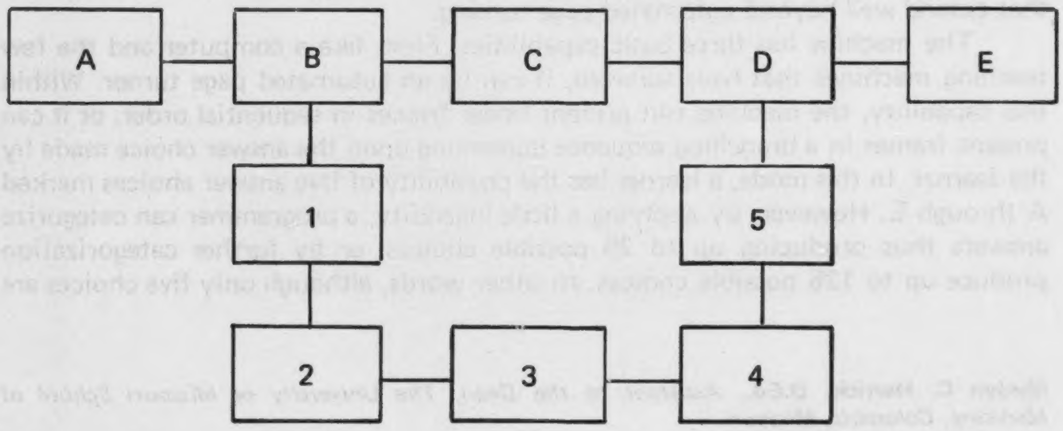
Merlyn C. Herrick, D.Ed., *Assistant to the Dean, The University of Missouri School of Medicine, Columbia, Missouri* available at any moment, the actual number of choices is essentially unlimited. Unlike other teaching machines using branching programming, on this machine the learner does not have to push the right-answer button to move on in the program. The device is totally flexible leaving all programming decisions to the instructional programmer.

With its second capability, a built-in memory, this device departs totally from the current field of "teaching machines." With this memory capability, the device can adapt the program to fit the learner's individual needs on the basis of the responses he has made in the program. Flow Chart No. 1 illustrates an application of this capability to a review of material presumably learned at an earlier time. The program consists of several questions in a pre-test which serve to determine whether the learner has command of the concept being tested. If the learner answers the pre-test correctly, he is moved on to a pre-test over the next concept, and so on. However, if he should answer incorrectly, it must be assumed that the learner needs some remedial work on that concept, so he is routed through a remedial sequence. If the programmer wishes, he can require the learner to pass a post-test before moving on. If the programmer deems it unnecessary to retest the learner, he can let the learner go directly from the remedial sequence to the next pre-test.



Flow Chart No. 2 illustrates an application of the memory capability in totally new material. In this chart each block represents a sequence of frames. For simplicity the branching in any block is not diagrammed. Note that at B, if the learner has progressed without error he can move on to C, to D and thus to E. If he has made an error in sequence A or B, however, he is automatically shunted through a different set of materials shown as 1 through 5. Whether he re-enters the main stream at D or back at B or C is a programming decision, which will be implemented by the machine.



The third basic capability of this device is that of timing the display of information. The period of time during which the learner must make a decision and enter his response is adjustable between 5 and 60 seconds. Our enthusiasm for this feature stems mainly from its applicability to such problems as diagnosis and treatment of arrhythmias. We can program the presentation of a series of EKG traces which change automatically, say every 15 seconds. If our student does not respond by pushing a button indicating his choice of treatment in an appropriate time interval (or if he should make an inappropriate choice) the display will automatically show a degenerated heart trace. In the extreme, the display might well be a straight line along with a statement to the student saying, "Your presence will be required at autopsy tomorrow morning." On the other hand, appropriate treatment would result in an improved trace.

These three capabilities: linear or branched frame presentation, memory, and timing are all available to the instructional programmer in the basic machine. With these capabilities in a discrete self-sufficient device, we have achieved the characteristics of adaptive self-instruction usually reserved to **computer** assisted learning. And because the cost of the basic hardware is less than $550 per unit, we can own outright a number of units for one month's rental cost of a basic computer CAI system.

The system I have described uses ordinary 35mm non-perforated microfilm for its storage medium, a fact which provides an additional advantage. Because the film is a high contrast photographic medium, the display is not limited to alphanumeric characters but may include maps, charts, graphs, line drawings, and even half-tones—anything which could be printed in a newspaper.

In addition to the programming characteristics we have described, both audio and visual images can be used to supplement the basic visual display. We have both a slide projector and a tape recorder attached to and under the control of the basic unit. As a learner progresses through a program, regardless of which frame is next presented to the student, the appropriate 35mm slide and appropriate recorded sound is also presented. In other words, no matter where the next frame is physically located in the program, as the basic unit moves to that frame, the tape recorder and the slide projector move in synchronism with the program. Thus we have the equivalent of a sophisticated audiovisual CAI terminal, at an outright cost of less than $1500, and minus the clatter of a typewriter.

It should be evident that with these capabilities this system imposes few constraints of any significance upon instructional program design. In fact, it will be some time before most instructional programmers achieve a level of sophistication in their work which will tax the capabilities of the system. When that time approaches, we will indeed be ready to make good use of computers, **per se**, for CAI—something rarely evident today.

Let me introduce a word of caution at this point. The annals of audiovisual history are filled with examples of hardware-oriented ventures which fell flat on their faces for lack of programs. Although I have been describing a hardware system throughout this presentation, it is only a secondary although an essential consideration in a CAI activity. Without suitable programs, the system can become as defunct as the teaching machines of the early 60's. The system I have described is particularly interesting to us because it provides capabilities which our programming efforts have shown to be necessary or highly desirable.

In summary, we feel that we have found a suitable solution to the hardware problems in computer assisted instruction. Having one at hand, we feel that we can make the best use of the computer by using it in designing, testing, and revising programs. The ease with which changes can be made in programs and the

record-keeping capabilities make a computer ideal for such a task. We feel that for interaction with learners, we are also making the best use of the computer by substituting for it the hardware system I have described, because a computer terminal does not, at present meet the three criteria necessary to be the best interface with learners.

TOWARDS A FUSION OF TECHNOLOGY AND CURRICULUM IN PRECLINICAL TEACHING

Louis G. Audette

Two pressures—quantity of information and money—have stimulated a national trend for change in the medical curriculum. The "information explosion" is producing more factual data than medical schools can possibly teach within their traditional time structures. There is the insidious effect of the soft money to which we are so distressingly overcommitted; to keep the grant money flowing the schools must constantly change their programs. Even a change for the worse carries with it an attractive aura of newness which invites funding support. By the same token, an established, successful methodology must be challenged repeatedly with "innovation" and reinforced with qualification if it is to survive. This nationwide preoccupation with curriculum change offers a splendid opportunity to plan, test, and produce new forms of instructional materials. Although some of our administrations have yet to realize it, the days are long past when the ubiquitous audiovisual assistant lugging a slide projector from his basement closet provided the extent of a school's audiovisual support.

The traditional educational presentation involves a particular teacher's interpretive assemblage of facts into his own instructional method. It is often apparent that other teachers reject using his presentation, no matter how it's packaged, not on the basis of the facts it presents, but because someone else has usurped the satisfaction of subjectively selecting, interpreting, and assembling those facts. Suppose, however, the content of the materials which we produce is primarily factual, without our own modifiers or couplers or relative clauses, and is catalogued in a flexible, branching system which offers complete selectivity. Then the materials could be integrated by anyone into his own study or teaching methodology. Such a system would be universally adaptable, providing construction materials for anyone's teaching approach. For example, most of today's catalogs are linear; like menus they describe the fare as concocted by someone else. A branching catalog would be like a geneology, and you could pick a bit of knowledge from this branch, or this one, or several over here, to suit your own presentation needs. With videotape, computers, and EVR, the technology of retrieval and assembly is available now. The forecasts of men like Peter Goldmark, Edwin Land, and Michael Romano, with their personal tele-packs, data compression, and universal time sharing, no longer seem visionary.

An entirely new architecture, in which data storage and display have been married to structure, is evolving in the learning resource centers at such places as Buffalo and La Jolla. Such centers could contain Modules of information, available at any time and transmittable to any place. Course catalogs could be designed without the limitations of rigid scheduling. Teachers and students could call up modules of information when they were pertinent to the study in question, or when their own time permitted. Seminars could be devoted entirely to discussion, provided they were held after the participants had prepared at the resource center.

The opportunity, you see, is to design these modules from within a changing curriculum, and not to devise enrichment for an existing one. Medical teaching is

Louis G. Audette, *Lecturer in Anatomy, Director of Medical Television, Yale University School of Medicine, New Haven, Connecticut*

based upon the presentation of case, historical, and experimental examples. As basic ideas are re-thought a need emerges for films, videotapes, and other methods of recording observations essential to teaching. The need is organic, and the materials can be authentic rather than decorative. Within the changing curriculum each medical discipline has the opportunity to study modes of instruction and to identify those which are most effective. We, as producers, will assist in designing the appropriate modes. Because our specialty is the translation of teaching requirements into visual presentations, we should use both the language of display and the language of medicine with expert proficiency. Our products could be as basic and indigenous to the curriculum as textbooks, and might even supplant them. I think producers have a legitimate function in the planning of curriculum, and a place on the heretofore sacrosanct curriculum committees. We should not overlook the wealth of potential modules which exist already in drug company film libraries. Permission should be sought to gain access to these libraries for stock purposes. Appropriate acknowledgement, copyright, and remuneration are areas which warrant immediate attention.

While for the purposes of this talk my examples will be arbitrarily pre-clinical, what I have to say applies to the entire spectrum of medical education.

There are two categories of medical communications. There is quite a difference between the materials as they are obtained and those which have been processed for distribution. The first is the SERVICE category, which is the real time recording of activities and demonstrations with which to fill a primary data bank. Lengthy experiments, experiment with doubtful or undependable results, entire operative procedures, interviews and history taking, procedural demonstrations for laboratory courses, observation of human or animal subjects, and the recording of other types of data displays like oscillascopes, electron microscopes, charts, and flouroscopes, all fall into the SERVICE category. In actual practice pre-editing and selection are employed, but the data is generally excessive in quantity and lacks accessibility or focus.

These bulk materials, therefore, have to be anthologized for effective use and distribution. Working together, the teacher and the producer cull the data for portions of instructional significance, and with the help of librarians and computer specialists, arrange the bits for convenient access. They are catalogued and inserted among the pre-existing modules already in storage. Then, selections can be made and decisions achieved about the most appropriate mode of display. Modules accumulated over a period of time can be combined to supplement or clarify any demonstration.

The point is, we now have a way of maintaining all of the elements of a learning experience, without trespassing on or eclipsing the human element. Our modules don't have to be thrown into a specific relationship for all time, but can be discarded, recombined, or added to as knowledge grows and changes. They can be distributed in kit form.

For example, consider the recent evolution of the Gross Anatomy course at the Yale School of Medicine. We have dropped from nearly 300 hours to 136 in five years. Our latest, most significant cut in time was forced by a schoolwide curriculum change which would not have been attempted if the Department of Anatomy had not by that time been wholly committed to, and experienced in the use of, television. Television has enabled us to offer a more efficient course with higher content than ever before. Student/teacher contact has increased, and the students see far more detail on the monitors than they saw at the old fashioned, crowded prosections. The television guides their dissections, and provides supporting material when the students want it. The spectacular time cut forced us to examine and evaluate the way we thought Gross Anatomy should be taught, and we suddenly realized that its traditional, ponderous emphasis on minutiae was clearly unsuited to the pace and needs of today's classes. Effective television was by no means automatic; it took three entire generations of tapes for us to be satisfied with their utility. Software requires much more effort than does the simple manipulation of the machinery. Our first try failed because we were unaware of the threshold of concentration. Now we think that any high density TV demonstration which exceeds twenty minutes in length is too long. Within the new curriculum we were forced to cut and pare, and thus we developed segments or MODULES which could be used in a multidisciplinary way. Now a demonstration of the Anatomy of the orbit can be plugged into Human Development, Gross Anatomy, Physiology, and Pathology. Reinforcement through repetition is achieved, yet teachers in each of these disciplines are saved from re-inventing the wheel each time around. The acquisition of modular bits of information happens, by the way, to de-emphasize the ostensible threat we offer to the traditional instructor who sees television and film as taking over his identity. For such a person participation in the design of units of knowledge is more palatable than the wholesale consignment of himself to a reel of tape. Our production efforts are designed as building blocks which show one teaching concept only. They provide elegant examples of procedure, or review, or clinical correlation. None shows more than one of these approaches, yet they can be combined with the others to suit the instructor's or the student's needs. Libraries are being developed from our bulk recorded, SERVICE material in all of the basic sciences.

The organization and distribution of these electronic library resources will be fundamental to our future use, production, and facility planning. The manipulation of basic documents or modules, in whatever media, will result in broadly reinforced learning experiences which are not now available to teachers and students dependent on the usual constraints of time, availability of subjects, and instructional timetables. Central computer and dial access techniques will make our modules widely available. Because of this extensive distribution potential, we are committed to productions of the highest scholarly and technical quality.

THE USE OF AUDIOVISUALS IN CLINICAL TEACHING

Introduction – Francis Wood

I am Francis Wood. As chairman of the panel I have some impressive credentials. I am a member of the Department of Medicine at the University of Washington. I am in the Division of Endocrinology and a program director of the Clinical Research Center. The qualifications for being chairman of this panel are primarily two. One, I hate the bad or inept use of audiovisual materials, and secondly, I made an audioscan program at one time on the oral treatment of diabetes mellitus, and now in retrospect, I am not too proud of it, and so here I am. Fortunately, I have a good panel to back me up and to help carry, or I should say, whom I can perhaps help carry on the discussion. The question that I faced in setting up this is "How can I best cover the problems that exist?" I think the area of problems are those in production and those in obtaining faculty cooperation for the production of audiovisuals in medicine. Problems of this type, obviously the problems of equipment, are not really great. Equipment is well in advance of where we are in general in the field of medical education. I decided to divide the topic of "The Use of Audiovisuals in Clinical Teaching" into four areas, and these four areas would include the input, which would mean–how do you determine what sort of audiovisuals are needed for your particular application? What sort of information can you obtain? I think the input area is often neglected. The input then leads on to information on production, and we have an equal problem here. How do you get prima donnas in the medical school to produce something that is really worthwhile, squeeze money out of deans, things of this sort. Production goes into the area of distribution. How do you distribute the materials you have to people who need them? Of course, in this area of distribution are the problems that we heard about this morning, the incompatability of a lot of machines. If you have made it on one type, how do you get it transferred to another type of TV tape or film, or whatever you are utilizing? This is the third area that we will discuss, and then go to the area of evaluation. How do you evaluate what you have done? Have you done a good job? Have you reached the people you want? Have you taught them what you were trying to get across? And, of course, from evaluation, you go back to input. How can you change the next time? How can you improve the situation? These are the four areas that we are going to discuss, that seemed to me problems in the use of audiovisuals in clinical teaching, and the panel members who will lay the groundwork of these topics are seated here before you.

Francis C. Wood, Jr., M.D., *Associate Professor of Medicine, University of Washington, Seattle, Washington*

THE USE OF AUDIOVISUALS IN CLINICAL TEACHING

THE INPUT REQUIREMENTS

James Dyson

When I first began to think about "input requirements" a mental "visual" came floating through my mind. I saw an image of one of those very large hoppers that are commonly seen at the home base of a ready-mix concrete plant. According to a specified recipe, various quantities of sand, gravel, cement and other chemicals were measured into the hopper. This was then dispensed into several mixer-transit trucks, taken to a construction site, poured into forms, and allowed to harden.

There are several potential analogies between this illustration and the development of effective learning experiences. Just to mention one of the less obvious analogies: *It is comparatively easy to establish effectiveness of concrete recipes. It is infinitely more difficult to establish and test for effectiveness of learning environments.* One of the biggest hangups is not with an inadequacy of learning theory development, nor with inadequate testing techniques. It is mostly with the psychological sets of the people involved in educational planning and implementation.

There is nearly a universal feeling among health science educators that input requirements are simply come by. It was simple for me when I first began teaching. Since I had gained a graduate degree in a science, you will know that I had been exposed to a multitude of undergraduate and graduate courses of subject matter instruction. There is a national myth which says that this somehow qualified me to teach science in a university setting. Since no one had suggested my graduate science education might include instruction in educational design, I seemed to unconsciously assume there was nothing there of importance for me. With great embarrassment I will tell you how I planned my first courses. I simply selected the best textbook in my discipline by intuitive judgment, and noted the number of pages. Then I divided that by the number of lecture-meetings in the course—presto—the number of pages to be "covered" in each lecture.

What had I done in utilizing this method of course planning? I had inadvertantly made the people who had written the textbook the curriculum designers for the course. As you are all well aware, most science textbook authors have little thought of educational psychology in mind when they write their books. Their main concern was to include all that was known in the discipline and to present it in some kind of organized form. From my present viewpoint, I would like to state that any approach to deciding what the input requirements are, other than basing them upon what the student actually needs to know, is just as meaningless.

In many clinical science departments another potentially meaningless criterion is often used; that of the professor as a literal model for student behavior. This source of input is in the subjective person of the teacher himself. We are all aware of the emphasis that has been placed on clinical research in the past 20 years. This emphasis has resulted in a faculty selection process away from the practicing physician model toward the research scientist model. Rarely is there a person who excells in both areas. Both types are vaulable assets to our society, but how odd of

James Dyson, Ph.D., ***Head, Continuing Education Section, Colorado-Wyoming Regional Medical Program, Denver, Colorado***

medical school administrations to point with pride to only one type.

In the past few years there has been a dramatic increase in demand by students for a voice in their own curriculum development. This point-of-view is often met with the negative faculty response—"After all, who knows best what a student should know and be?" This is a research oriented faculty, mind you, speaking from minimal practice experience.

Oddly enough the consumer of medical services is very rarely allowed to provide input for that education/learning pot called medical education. Although he has not been asked directly what kind of physician he would like to have, his feelings are beginning to be felt. Consider the following examples: *In malpractice suits, the courts representing the consumer have decided that physicians are responsible for a level of practice according to national standards, and not necessarily local standards. The lack of social consciousness on the part of the medical establishment for the level of health care for the poor has been widely discussed. Some studies of the health care consumer indicate a desire for a family physician rather than a body systems specialist.*

Prepaid health care plans are beginning to see a savings in a well implemented program of preventive medicine. Few medical school curricula have responded to these trends.

With all of this now as background, we can now consider the question—Input Requirements—based upon **whose** preception of need? Medical students? Research-oriented clinical faculty? Patient-oriented associate clinical faculty? Informed lay leader?

The answer? All of these! The same question could be considered by all these sectors—"What does a practicing physician **really** need to know so that he can provide the highest possible level of health care commensurate with contemporary economic abilities." Beware of all those statements that begin with: "It would be **nice** if he knew . . ." The formula for penicillin, the history of "X" disease since its first description, or current clinical research activities. I would suggest a check question on an item being considered for inclusion as an input requirement—"Will this provide a better level of health care at the time when student will possibly be putting it to use?"

I am suggesting that whenever a learning unit—of any size—is planned, a representative of all groups that would possibly be effected by the learning unit—either directly or indirectly—be involved in planning from the very beginning. Although this is a most difficult concept to implement, it will have a great long-term beneficial effect upon what you are really trying to accomplish. Because this difficult concept is so important, I would like to place major emphasis upon it in this presentation.

Turning now to: *What does one do when the expected outcomes for a learning unit have been established?* There are a series of organizers that are useful. One of the most useful at this point would be the identification of each expected outcome according to the criteria:

mostly recall knowledge
mostly psychomotor skill
mostly cognitive skill
mostly a desired change in attitude.

Recall knowledge consists of the facts that the student should learn and have available in his memory for useful recall. Psychomotor skills might be the operation of a piece of equipment, or a surgical technique. Cognitive skill development would be the ability to make a good differential diagnosis. An attitude change might be a motivational problem. For example, a student may have all the requisite knowledge and psychomotor skills to effectively handle a patient situation, but he may skip over a certain procedure because it is tedious, distasteful, or in his mind seems not to be important. There are few learning objectives which fall totally into just one of these categories. However, they often are predominantly in one more than another.

Skills, whether psychomotor or cognitive, are most effectively learned by actually doing the procedure. With the exception of the use of some kind of simulator involving audiovisuals, skills in general are not too amenable to audiovisual utilization. Attitudes are most effectively changed in some kind of interpersonal interaction. Group discussion among peers is an excellent choice of learning format for this.

This leaves the transfer of factual information from some resource or cluster of resources to the learner as the best utilization of audiovisual techniques.

(Discussion of handout follows)

SOME PRINCIPLES OF LEARNING*

1. Students enjoy learning when they learn about things which are **relevant** to their past or present circumstance, problems, or difficulties, when learning is meaningful, significant, and timely in terms of their own concerns.

   Illustrative of this principle is the common practice of selecting literature which deals with the focal concerns of many disadvantaged youth—sex, authority, fate, justice, violence, and courage.

2. Because individuals differ so much in so many ways, learning experiences should provide a maximum diversification of materials and activities and of ways of evaluating what has been learned. Interests, abilities, needs, and concerns are cues to **individual learning**.

   Illustrative of this principle is the attention given to a very small pupil-teacher ratio (about 6 to 1), individual guidance and tutoring, and the widest possible selection of books and instructional materials to appeal to individual interests, tastes, and abilities.

3. Students with disadvantages, like most learners, prefer to be **active learners** rather than passive receivers. They often respond to opportunities to dramatize, to role play, or to pantomime.

   An application of this principle is provision for students to write and produce dramatic principles and incidents from novels, or short stories, to act out critical confrontations in history, and to stage mock meetings of legislatures or congresses.

4. Students are more likely to enjoy learning if they are able to help others or **associate with others** in learning experiences.

   This principle suggests the utility of providing opportunities for students to confer and assist one another in improving compositions or other written work and to join in small discussion groups to thrash out issues in social science or literature.

5. Students find learning experiences more satisfying when they **participate in defining** what they are trying to learn and in judging their success in learning it.

   This principle is exemplified by frequent teacher-pupil planning sessions in which what has been learned is reviewed and evaluated and new areas or fields of attack are discussed and selected by the group. It is also fulfilled in teacher-pupil conferences at which the work of individuals is appraised and strengths as well as weaknesses are clarified for the learner.

6. Pupils enjoy learning experiences most when they are provided frequent opportunities to **express themselves** in a variety of ways—physically, intellectually, and emotionally—in speech, drama, art forms, and creative compositions.

***Taken from: "Pawns or Players?" by Eugene McCreary, which appeared in the *Phi Delta Kappan*, 49:138-142, 1967. The principles of learning have been adapted from: *Theories of Learning*, by Ernest Hilgard, Appleton-Crofts, 1956, pp. 485-487.**

This principle is illustrated by opportunities for debate and argument over social issues, by dramatizations, by artistic and other constructions, and by varied truly free creative writing experiences, particularly those of a projective nature. Projective writing encourages the expression of deep anxieties and troubles and their sharing with others, a process which seems to be both instructionally valid and therapeutically effective.

7. Pupils are likely to enjoy learning if they are permitted the widest possible **freedom of choice** of curricular emphases, learning materials, and learning activities. Much that most interests and concerns many adolescents, whether or not they are "disadvantaged" lies in areas considered controversial or dangerous for public schools to consider—civil rights, war, juvenile deliquency, sex, law enforcement, school practices, and so forth.

   This principle is met by unlimited freedom in the choice of literature and in the choice and discussion of issues in English and social science classes. Often taboo areas are the most interesting to pupils and elicit the more serious and responsible study and discussion.

8. Pupils experience special satisfaction when their work gains the **recognition of others, especially their peers.** Such recognition does not have to be achieved in purely competitive activities.

   This principle is emphasized in the practice of encouraging the oral sharing of written compositions with the entire class, in the provision of group discussions of literature that has appealed to individuals (rather than the more formal book review written for the teacher alone), and in the publication of yearbooks or class books which contain art and literature created by ***all*** *students.*

9. Learning experiences are peculiarly satisfying and mastery and retention are promoted when students are encouraged to **discover for themselves** important relationships and principles.

   This idea is promoted in English, mathematics, and the social sciences through careful instructional guidance by teachers who lead young people to the point where they can discover and test for themselves significant relationships and generalizations.

10. Pupils experience satisfactions when they realize that they are needed, when they can perform in **roles of real significance,** when they can help others in meaningful ways.

    This principle is illustrated by the practice of employing significant numbers of older pupils to serve as assistant teachers and to perform other necessary work about the school, on the yearbook, in the school office, or in organizing activities.

Each of the above principles can be put into effect in schools in dozens of ways. None is original or new, but it is unusual in (secondary) schools to plan in detail the application of basic principles of learning in all phases of school operations. There are a number of other sound learning principles which might have been added to the above. In working with students who have disadvantages, as well as with others, it should be the intent of all teachers to so organize learning that pupil satisfaction and success result. Success is a powerful stimulus to learning motivation. Not only do we like what we get good at, we often get good at what we like doing.

THE PRODUCTION OPPORTUNITIES

Marion Johnson

The world turns on the transfer of information. We see this transfer expertly exemplified every day in our own lives and in the commercial world, where there is a cash premium for moving information quickly and effectively.

Educators are in the information transfer business, too. They must impart facts, create certain attitudes, teach skills and motivate people to very specific kinds of behavior. Many of the complexities which baffle educators may stem from the failure to reduce the communication problem to its simplest terms: that of one prepared intelligence transferring information to an unprepared intelligence. Education even as Dewey defined it . . . "the scientific method by which man studies the world and acquires a cumulative knowledge of its meanings and values" is communication, information transfer.

Unfortunately, educators are handicapped in that they are in competition with a formidable array of communicators, most of whom are smarter, richer, and considerably more efficient than they are. To compound the problem even more, these expert communicators armed with unlimited funds and employing every bit of technology available, have changed the nature of the student. Marshall McLuhan's aphorism, "The medium is the message" is not an idle warning. The student who is now in medicine has been conditioned to learn through all of his senses and exposed to the shrewdest programming; now the sophisticated appreciates only the sophisticated.

This presentation will examine faculty resistence to the use of the newer media, consider changes in the learning environment, and list a few of the organizational blocks to visual literacy within the medical school. By way of suggesting a partial solution to the medical communication problem, the structure and staffing pattern for a multi-media learning resources unit will be proposed.

Communication Lag

There is little doubt that the development of communication in both undergraduate and continuing medical education has not paralleled the development of communication in the economic, political and sociological fields. One wonders why. Maybe it's innate conservatism of the medical educator who answered a question regarding his use of the newer teaching methods by saying, "We have tried Hippocrates and find him good." Maybe it's a hangover from World War II's highly successful Manhattan project, which very nearly convinced the scientific community that all their problems could be solved by research. For twenty years, we have seen enormous private and public investments back this premise. But only recently, with the advent of Public Law 89-239, which created Regional Medical Programs, has there been much acknowledgement that research in medicine is of little value until the results are made known to the practicing physician who in turn applies the information to his patients. Thus, both the art and the technology of communications must now be important considerations in teaching clinical medicine.

Marion Hoff Johnson, *Director, Production and Communications Information and Education Resource Support Unit, Washington-Alaska Regional Medical Program, Seattle, Washington*

Faculty Resistance

There has been and still is another element impeding the use of modern communications technology in medical schools. It is faculty resistance. With certain notable exceptions, most of the current leaders of organized medicine, professors and deans of medical institutions, are men whose educations have been geared to the technology of Gutenberg's movable type. They are accustomed to the lineal arrangement of language on a page—a picture here and there which supplies information without risk of involvement. A silent, solitary, rapid scanning of words arranged in horizontal lines fragments knowledge toward extreme specialization and tends to, or certainly has contributed to the creation of the abstract, withdrawn, even alienated man. This is not to label faculty withdrawn or alienated, but to suggest that they are not comfortable with nor prepared for the exposure involved in the electric media's instantaneous presentation of all types of facts and facets of any given situation. Furthermore, they did not get their educations from a TV screen or a film, and they tend to doubt that others can learn much of value that way.

Many are sincerely unenthusiastic about the electric media because they are aware that great amounts of money have been expended, in medical television for example, with unimpressive results. Programs have been too long, production amateurish and not well directed toward the viewers' interests or needs. Medical schools which early made considerable investment in television equipment did not make the necessary investment in production personnel, consequently the hardware was unused most of the time and is now outdated. It has been an expensive experiment. Many of these objections are now being overcome. The educational objectives of the viewers are at least being considered; single concept film loops, video and audio tapes are seen as valuable only if they are closely integrated with texts, lectures and laboratory experiences. While quality is improving, uniformly superior programs are not available yet from many of the production centers due to restrictions which have to do with inadequate funding, lack of creative personnel and insufficient time for production. Yet unsatisfactory programs should not prejudice us in our use of the new media. Who would argue that the printing press is worthless because of a few poor books?

Changed Learning Environment

Students who have grown up in the electrically configured world think differently than those of us who have had to depend on the printed page. They think not in fragments but in integral patterns. Even elementary children have a total structural approach to mathematics and meditate about 'number theory' and 'sets' rather than specialized problems in arithmetic. With the instantaneous flow of all types of information, we have to deal with the simultaneous order of all elements in a composition. This is the time of the 'total relevance' concept. One look at the Husky Den lunchroom at the University of Washington at noontime is confirmatory. Two color TV sets, numerous transistor radios, a newswire and stock market tickertape are all in simultaneous operation. The great speed and precision of this factual flow calls for the consideration of medical educators, because our texts and curricula still move at the typesetter's pace. Whereas the students in that lunchroom, and those who will soon be in medical school, take for granted a pace of a very different kind. It is estimated that by the time a student has graduated from high school he has been exposed to 10,000 hours of formal classroom teaching and 15,000 hours of informal television teaching at home; he is expected to have seen at least 500 films. It is little wonder, then, that the time-honored laboratory-lecture-text approach of the medical faculty seems anachronistic and self-limiting to the 'turned on' student.

Whether you are a fan of Mr. McLuhan's or not, it is difficult to argue with his premise that whatever alters the sensory threshold of an individual alters the outlook and experience of our society. He sees the electric media, radio, telegraph, telephone, films and television, as extensions of the human sensorium, which are altering our sensory balance and therefore subtly reshaping the society which created them. He feels that if we are to retain the values of book-trained perception and judgment, it can only be by learning how to incorporate the former lineal and analytic habits of mind into the new patterns of mind already being established by the electric media which are not at all lineal in their modes of arranging and presenting information.

The Organizational Road Blocks

Can medical illustration departments as they are traditionally constituted fully utilize the capability of the electric media to speed up information transfer to students and provide a multi-dimensional learning experience? In your institution you may have an updated department and can answer such a question with an unqualified 'yes!' Many illustration departments are hampered by a number of problems which may not be exactly atypical and therefore worth considering.

For example, one department is split into three parts, located on different floors, separated by what seems to be a half a mile of corridors. Medical Photography is mostly concerned with reproducing materials for slides and photographs for professors who are publishing articles to add to their bibliographies. The staff of Medical Illustration, headed by a Johns Hopkins Medical Arts graduate, spends most of its time doing intricate, precise medical art and hand lettering charts and graphs, again for publication of research articles.

If a lucky professor has garnered funds from some pharmaceutical company to make a film, Medical Illustration and Medical Photography have had (until only recently) opposing cinematography units, neither well equipped, who competed for the assignment. Health sciences television service is virtually immobilized because of lack of funds. Equipment is outdated and inadequate. If a division within the medical school can divert some research funds for the production of a tape, this can be arranged if the production requirements are very simple. While production salaries are carried on the Health Science Division payroll, there are no funds available for undergraduate teaching production, and each department wishing Medical Illustration services must pay for them out of their departmental budgets. This would be reasonable enough if there were departmental funds allocated for teaching; there are none. Therefore, to improve his presentation to his students, a faculty member is forced to pinch funds from his research projects. They are reluctant to do this because grants are dwindling, and they complain that audiovisual services are too costly, too time consuming, and don't add enough to their teaching presentations.

This is not to fault the ability of the people in Medical Illustration. They are competent, but for the most part prevented from participating in the educational process because of inadequate funding and a poor organizational concept. In those few instances where undergraduate teaching aids are being developed the professor presents the material he wants transmitted visually, supplies a reference, if needed, and awaits the results. The relation of the visual to the over-all course content, to the lecture, to the text, to the essential concepts to be emphasized, or to the evaluation isn't known, certainly not to the visual educator and maybe not to the professor. Too often, too much information and the wrong information gets into the wrong media and thus the real opportunity for visual interaction is lost.

One of the reasons medical illustration services are expensive is that they often use outmoded techniques. For example, much of the drawing of medical artists could be reproduced immediately by going to out-of-copy-right texts and photostating the needed material. No one should afford hand lettering, when punch type is so much better and inexpensive. They fail to put the volume requirements first and are too perfection conscious. For example, when specifications for a cinematography unit to do film inserts for our Regional Medical Program videotapes were submitted, all the double system sound equipment necessary to take advantage of the Arriflex optical sound capability was listed, overlooking the fact that we had **neither** the personnel, **nor** the money, **nor** the time for the expensive double editing. Magnetic sound was all we needed. Similarly, many departments continue to use film with its costly developing, editing, and printing processes, instead of using the tape transfer method for those subjects which do not require extremely high resolution. Again we should learn from the trade. The TV commercials we will see this fall from several of the large automotive firms will have been first videotaped and then transferred to film because the process is so much less expensive. Perhaps we should notice, too, that our large industrial corporations with products to sell, i.e., information to transfer, do not produce 16mm films, assemble people in dark rooms at specific times and locations and turn on projectors.

Planning for future productions in educational institutions should reflect the fact that tape transfer has replaced film (except for certain specific requirements) and that electronic video recording has eliminated mechanical projection.

Organization of Learning Resource Center

The question, then, should not be whether we are going to have media production centers within our medical schools, but how to have satisfactory support units with limited funding. The logical place to turn for a model is the commercial sales world, where survival depends on cost effectiveness. While some large advertising agencies have extensive art, photographic and printing departments, the assembling and training of a creative staff represents the real investment. Preparing information for transmission—that is organizing information in terms of the priorities you have, devising a successful format and then adapting the information to that format—are all considerations which must come before the actual and often routine production tasks begin. The account executives act as liaison between the artists, writers and media specialists in the agency and the person who knows what information he wants to move, the client, or in our case, the faculty member.

Very often, physicians are on medical faculties, not because they have special qualifications as educators, but because they are "subject matter specialists". This means, then, that the 'liaison person'—the parallel of the account executive—should be an individual who understands how persons learn, should be able to analyze learning problems, decide if certain basic elements can be isolated and taught to a large audience before the complex elements are taught in smaller seminars, or in the one-to-one arrangements. He should be able to counsel faculty so their time and resources are used economically and effectively. This person, who we might call director of learning resources, should be a faculty member responsible directly to the dean or an associate dean in charge of curriculum. The director should have on his learning resources staff one or more audiovisual writers, medical editors, artists, TV film producer-directors, and photographers—all people possessed of a high degree of visual literacy. In large institutions, each of these individuals may head a department with a number of technicians operating in-house equipment. Smaller institutions will hire the creative talent, but subcontract the technical production operations. In any case, the people who deal with the specifics, the artists, writers, TV or film producers, will not be involved until the goals are set, objectives determined, some sequence established and an evaluation planned.

Somewhere in the process, faculty will learn they can't put as much as they'd like on a screen, that AV programming is only another dimension which clarifies, reinforces and actualizes. It doesn't supplant them or the printed word, but serves as a catalyst to speed up the learning process and to stimulate the student to inquire further.

The first instructional task facing directors of new support units may be teaching medical faculty how to use their services. If his department is thinly-funded, he might be well advised to give only one or two divisions full attention until the value of organized teaching support is demonstrated.

Once the material has been well organized and produced, the problem of distribution remains. The computer, with its information storage and retrieval capabilities, has unlimited possibility for delivering programs instantly to classrooms, library study carrels, hospitals and private medical offices. The basic elements now exist for a national and international scientific network for technical and data repositories which will be of enormous value. When medical school curricula are more standardized, and when schools are computer-linked, the production responsibilities can be lessened because they can be shared.

At this point, however, most of us are struggling with the steps that evolve toward these goals. Now the student in the study carrel must call the TV tape operator and ask for a certain program, only to be told perhaps that someone else is using it, or he may have to consult his reference list and go to the shelf to find the right film loop and put the cartridge in the rear-screen projector. Certainly as the information explosion continues, the classification and retrieval of information to assure its instant availability represent problems far more difficult and expensive to solve than the production of audiovisual support material.

There are several conditions essential for the successful operation of a production facility: 1) Audiovisual service for undergraduate teaching must have unqualified support and enthusiasm of the institutions' administration; 2) The unit must be financed adequately; 3) Funds for undergraduate teaching support should be clearly distinguished from those available to support faculty publication and research interpretation; 4) Priorities must be established to protect overextension of a small support group; and 5) Personnel and their office staff should be centered physically and administrated in one area support group. Equipment should be acquired cautiously with regard to technological improvements and obsolescence. The cost effectiveness of subcontracting more expensive procedures should be compared with in-house production.

Providing multi-media teaching assistance to the medical faculty will be costly and its effectiveness may not be immediately assessable. Yet educators can no longer overlook changes circuitry has introduced to their profession. When the man in mission control in Houston, Texas helped Neil Armstrong center his television camera, he did not just bring us a better picture of the lunar module, he demonstrated a profound change in human relationships, a change which may give us some hope of handling the information overload represented by medical education.

SOME THOUGHTS ON A NATIONAL AUDIOVISUAL DELIVERY SYSTEM

George Caras

The views of the author do not purport to reflect the position of the Department of the Army or the Department of Defense.

What is the primary purpose of a distribution system? Defined in the simplest terms, it is to provide a required item to a user. The degree to which a distribution system is successful is measured by its ability to provide the right item, to the right person, at the right time and at the right cost, and in a condition that will allow maximum and effective utilization of that item.

When Dr. Wood, my chairman, asked me to speak on the Distribution System of Audio Visual Aids in Biomedical Education, my immediate thought was—"What do I know about audiovisual distribution?" My conclusion was an emphatic "Not much." After further thought, however, I decided I did know something about a logistical distribution system and, specifically, a Department of Defense system that distributes medical supplies and equipment throughout the world. At this point, I wondered if there were any similarities, so I started to read many articles published or reprinted by the Council on Medical Television, the National Medical Audiovisual Center, and the Educational Television Magazine, plus articles and papers collected at the last Convention of the Department of Audiovisual Instruction of the National Education Association. My reading led me to several conclusions:

1. The value of AV aids in biomedical education is basically unchallenged.
2. There are many proponents of AV media use in the field of Educational Communications and specifically in the Biomedical Education field.
3. I foresee the need for an organization to unify, direct, and distribute biomedical education media to the **field**.

As I said at the beginning, there are several functions of an effective distribution system. I would like to discuss these functions by comparing the audiovisual and the military distribution systems and make some recommendations in each of these areas.

First, in order to meet the demands of the user, we must know **what** he needs and what he is **capable** of using. We call this first function, "requirements determination." Many writers in the field of the Biomedical Education have discussed this function in the areas of software and equipment. One point, and certainly a most valid point in the area of equipment, is to survey the Health Science schools and determine the type of equipment that is available to the user. A survey, even a questionnaire survey, will be valuable input for standardizing software that a system intends to distribute to users.

Now, before I get into standardization, let me say something about AV equipment. First, I know of no hard and fast formula for determining how many slide projectors, overhead projectors, 16mm projectors, video tape machines, etc., a school should buy per so many students, classrooms, or floors. We know there is a wide variance between physical plants, especially the older structures that were not planned for audiovisual use, but more important, our teachers work in different ways. Some excel in the use of a chalkboard, others in 35mm slide projection, others in overhead projection, an increasing number in TV, and yet others use no

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AV equipment and media. Personally, I advocate the audiovisual approach to effective communications.

Planning for investment in equipment must "come to grips" with the question, "What will be used—intensively used?" Sophisticated and costly equipment not used is worthless and tends to erode our already austere budgets. At this point, I would like to recommend hiring a professional Director of Educational Communications. This man should be an educator who has full appreciation of the value of audiovisual media and, more importantly, an appreciation of the magnitude of the job facing medical and related health science educators because of the knowledge explosion in the health care field in the past decade. Only by the proper mix of man, program, and equipment will we be able to meet the expanded communications mission brought about by rapidly expanding medical technology and accompanying knowledge. We must augment our medical educators with the finest equipment available to meet this challenge.

Once we have a reasonable idea of the hardware our users have and the type of software needed, we then can approximate a reasonable standardization. I am sure you will agree that if our users do not have the capability to view Super 8, then our investment in a motion picture film in the Super 8 format for our inventory will be a bad decision. When we talk about distribution of an inventory, we must consider our users—otherwise, we will put them into the untenable position of dis-investing and re-investing in new equipment. We must remember that hardware salesmen are not always concerned with how the equipment will be used; they just want to sell it. The trick here is to allow the user to utilize his on-hand equipment intensively during the initial phase of a proposed distribution system of software. If the user feels that he has maximized the use of his equipment, he will be psychologically prepared to invest in newer and better equipment—the distribution system can then influence the type and stage of equipment; for example, 1/2", 1", 2" video tape.

At this point, we should become aware of the fact that, in order to obtain a reasonable requirement, one function must be met—standardization. Otherwise, the investment for inventory of software that we intend to distribute will be financially prohibitive. Additionally, there must be compatability, for example, between video tape play-back machines. The subject of standardization has been cussed and discussed and I am sure will continue to be; however, in the field of distribution, standardization must do at least three things:

1. Consider the user.
2. Move with technology.
3. Be influenced by the distribution system, with this influence increasing as the distribution system matures.

Like the inventory of the Armed Forces, the sources of audiovisual inventory include purchase from commercial sources, production or manufacture within the organization, and at times refurbishing, redesigning, or repairing the organization-owned inventory to make a usable asset. Initially, our major source of inventories for distribution should be from inventories owned by health science schools. I am sure that the use of many excellent films, slides, and even video tapes are frustrated because they are in someone's desk or cabinet. I say "frustrated" because excellent work should be made available to teachers at other schools—and yes, even to other departments of the same school.

Management of the initial inventory coming from schools will not be easy. First we will have to address ourselves to classification of the various media, such as selecting the best available repairing, editing, crediting. Classification should also be done by the best man available on that particular subject. The questions he must answer are:

1. Considering the subject, is the media the best available of our total assets?
2. Is the content appropriate for the intended audience?
3. Are restrictions recommended in its use?

Then he must provide a synopsis of the AV media.

Classification naturally leads to another function—that of cataloging. If we want our inventories of AV media used, we must accurately describe them, thereby facilitating requests for their use. In the area of medical supply for the military department, we have a catalog, illustrated when possible, and divided into parts according to Federal Supply groups. For example, Federal Supply Group 6505 is the catalog for drugs, biological, and official regents; 6510—for dressings; 6515—Instruments; 6520—dental; and so on. Our catalog can be published in parts for the various AV media, such as 35mm slides, overhead projectors, video tapes, and 16mm motion picture film. In this way, changes will affect only a part of our catalog.

While we are borrowing, let us borrow the technique of change bulletins used in the Defense Medical Supply System. A change bulletin is periodically published and distributed to the field giving information such as deletions, additions, changes in restrictions, announcements of availability, and additional sizes. In this day, the coding system of a catalog should lend itself to mechanical processing of requests. Rapid processing and premium transport will do much to please our users.

Another source for our inventory will be what we can put together in our central facility. For example, if several schools make available their motion picture film strips on a particular surgical procedure, and especially those recording a research project, then it may be advantageous for the central facility to put them together and add an appropriate introduction and summary to make a superb film. Of course, credit must be given to the contributors.

The next source of input for our inventory is what we produce ourselves. Every effort should be made to preclude duplication in the production of costly AV aids. Because extremely scarce skills and highly technical equipment are involved in producing biomedical AV media,the cost is exceedingly high. I am sure that duplication often occurs because of the lack of communications. One idea of how to preclude costly duplication is to allow a teacher in the health science field to submit his idea—of, say, a video tape or a complete motion picture film—to an ideational committee. Of course, the idea would have to be a fully developed one like a project, complete with scenerio, scope, objectives, intended audience, some idea of cost, and expected use. The ideational committee would sit at the central facility and have full authority to use that facility's resources to make this idea into a useful AV aid for everybody's use. By resources, I mean, either making a grant to finance this project on site, with the idea man a technical advisor, or to bring the central facility's resources such as production personnel and equipment to the site. Oftentimes, the best work can be done on site, not in a studio. In addition, there would be the extra advantage of using research photography and graphics that are available at the site.

The ideational committee, in addition to approving and financing a project in support of medical education, would make their approval known to the field by use of an information bulletin. This bulletin would serve several purposes. First, it would let the field know what is being done so that planners could include this aid in their Program of Instruction. Second, it would preclude costly duplication. Last of all, it would allow interested educators in the field to submit their thoughts and ideas to the technical advisor for his consideration. Incidently, if this system were adopted, complete and deserving credit equal to publication in a medical journal, should be given to the idea man—the technical supervisor and author of the initial scenerio.

Now we have our inventory to distribute. Let me just state a few ideas on the functions of inventory management and stock control. First, the system should be mechanized. I envision a request from a user being coded and passed through the balance availability file showing on-hand, location, and other management data. If in stock, the item should be picked, packed, and dispatched with the minimum amount of delay. Premium transportation should be used. The additional cost incurred in getting the needed item to our users will be offset by the savings in inventory investment. Our inventory should be **lean** and **mean**. We should invest only in **what** we need **when** it is needed. This aspect makes standardization mandatory. We cannot afford to have a film in a variety of formats such as 16mm, 8mm, Super 8, 35mm, and video tape. Regardless of what pace industry travels toward standardization, we must begin now and move rapidly.

The next function is that of inventory management. Our mechanized system should be capable of giving us a cumulative demand series. Those items showing high, sustained, and increasing demand should be flagged for a decision as to whether additional copies will be needed. One word of caution—demand and use are not the same. If 20 schools demanded the same film at the same time, and you only satisfied 5 requests and give 15 others their second choice, your demands are 20, not 5, and your investment should be based on 20 recurring demands. If **uses** are the basis for investment, then inventory will be "geared" to please on the second choice. Our objective should be to please our customers on their **first** choice.

The last function is that of updating or, if necessary, disposal of outdated items. Managing an inventory is a costly function; therefore, items no longer needed or only sporadically used should either be updated or be purged out of the inventory and replaced with items that are being used or will be used.

Thus far, we have discussed a lot of ideas regarding a distribution system. Really, we have been talking about the extremities of a body. Now, let's come to grips with our problem on distribution—the brain. The brain to us today should mean organization. Who is to put our system to work, who will do the surveys, budget for the requisite monies, buy or make inventory, receive and fill requests, authorize projects, hire technicians, dispose of items, and the many other ideas that we have talked about? To my knowledge, we do not have a centralized facility equipped to get needed items to all users in the Health Science education field on time. We do have several superb organizations which are actively engaged in planning, producing, and distributing needed audiovisual media. We have the National Medical Audiovisual Center, the Council of Medical TV, the Biological Photographic Association, the Department of Audiovisual Instruction of the National Education Association—these are some of the leaders. There are others. What we need is a central **organization**, one that will unify the direction of the many interest groups and, above all, one that will provide service to the biomedical educator and, in turn, to the medical student, to the physician, and finally to the patient. I suggest the National Medical Audiovisual Center as a possible candidate for our central organization. My reasons are:

1. They are a national organization now and are therefore experienced in thinking, planning, and providing service on a national scale.
2. They have the requisite skills and, above all, interest. Few of us can ignore the writings of Dr. James Lieberman, Dr. Norman Cole, and their excellent staff.

3. Since the NMAC is a governmental organization, coordination with other governmental organizations would be facilitated. These include the Armed Forces Institute of Pathology, the several Surgeons General of the Armed Forces, and the Department of State, which should facilitate coordination with medical educators abroad.

4. Financing should be less difficult since operational monies are actually part of our national budget and are requested, approved, and distributed in accordance with the mission to be performed. Obviously, the mission will be greatly expanded.

The final suggestion is to incorporate our own organization. This plan has the advantages of complete control by the medical educators and will not depend on National fiscal policy for its operation. The disadvantages are that financing will be a significant problem, but, more important, the organization will have to start from "scratch." Regardless of the agency selected to head up the organization, I think that you will agree that an organization with the appropriate mission is necessary and really the only way to come to grips with the problem of distribution of AV media in support of biomedical instruction.

In summary, I have discussed some ideas for the management of inventories and the distribution of these inventories to users on a timely basis. I have suggested a type of organization to implement these ideas. In addition, I have stated that we must provide the proper environment for the organization to grow for the purpose of better serving us. This environment is possible through support by all interested groups. Support also means influence, and influence should be exerted by medical educators and other interest groups to assure that this organization works to please the educator. We can no longer wait to see what happens in standardization or who will head up the organization, for the time we lose is far more valuable than the additional cost that will be required to modify the organization.

THE EVALUATION HANGUPS

F. L. Husted

The essence of educational evaluation is found in the scope of the concept and the dynamic role it should play in any educational system. It is all-encompassing, involving needs, objectives, criteria, measurement and implementation. "Evaluation is a continuous progression of interdependent steps in which the objectives of an educative effort are formulated, standards of acceptable performance are established, measurements are made and results interpreted to determine the extent to which the educational complex has contributed to modifying student behavior in the direction indicated by the objectives."[1] Thus, evaluation is **not** a terminal act in which one measures student performance. It is a process which has its inception at the instant of needs determination and continues, in perpetuity, until the need for the experience, or the product, is fulfilled. All too often our attention to evaluation is riveted to a concentration on measurement; even worse—**post facto** measurement! It would be foolish to deny the importance of measurement but it **must** be viewed in terms of its proper function in the evaluation process.

If evaluation is, indeed, a process, where does it start? What are its primary components? As indicated above, educational evaluation starts with the determination that a given educational sequence is needed. Having established this, it is necessary that a set of objectives be developed which will define the desired ends; that criteria be established, measurements taken, inferences drawn and implementation effectuated.

It is only recently that the scholars in education have taken a concentrated look at the need for a clear definition of the objectives of any educational pursuit. Among the first to recognize the importance of this component in educational evaluation were Wrightstone, Justman and Robbins. In their work on evaluation they assert that "Teachers . . . must first define the values—the objectives—toward which they wish to guide pupil growth and development . . . these objectives then become the guideposts in curriculum development and evaluation."[2] Hagen and Thorndike view objectives as arising from the three domains of structure (physical facilities and equipment), process (educational methodology) and product (the students).[3] It becomes increasingly important, then, that objectives be given serious and extensive attention in the evaluation process as the "beginning of things" in each of these "domains" but particularly in the product domain. The thesis can be well supported that the product should be the primary focus and that the objectives in the other domains follow as "required" to realize the desired ends.

One of the salient features of this component of the evaluation process is that of established benchmarks with which one can identify a statement of intent or purpose as an acceptable educational objective. Frequently, one finds sweeping, platitudinous statements posited as "educational objectives" and an ensuing confusion between "goals" and objectives to the consternation of those attempting to understand the essential differences between them. A statement of intent must have the following attributes to be properly identified as an educational objective: (1) It must be free of ambiguity, accepted and understood by all who are

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immediately involved as faculty or students in the teaching-learning process to which it pertains; (2) It must be **practical**, realistically achievable in the majority of students to whom it is directed; (3) It must be **in harmony** with the broad goals of the institution within which it functions; (4) It must be measurable, lend itself to that level of quantification which the state of the art in measurement will allow; and (5) it must be stated in terms of the behavioral changes the experience seeks to effect in the students. These attributes are essential to the identification of an educational objective and should serve as guidelines for those who would truly seek to evaluate an educational experience.

"Once . . . the objectives . . . have been defined an equally difficult task remains: development of criteria by which later judgment takes place."[4] In this statement, Abrahamson identifies the second step in the evaluation process and one of the prime requisites of any analytical approach, the existence of benchmarks with which and by which judgments are made and conclusions stated. Evaluation is a process which involves an analysis of change and, as such, requires criteria, predetermined reference points which permit the analyst to identify the magnitude and adequacy of the change in the direction identified in each objective. In a statistical study, for example, the investigator sets a "significance level" on the basis of which he concludes (makes a judgment) as to whether the differences observed are "chance" differences or "significant" differences. His criterion might be stated, with some liberties, as follows: "If the value or statistic computed proves to be "significantly different" at a .05 level of confidence, I can conclude that the observed difference probably did not arise solely as the result of chance." His criterion is a statistically realistic one based on the theory of probability and postulated by scholars before him as a point at which he can consider his observations to be "unusual" and, by definition, acceptable evidence of his having observed something "different" from that which chance alone would lead him to expect. Two important points must be drawn from this example. (1) The criterion is selected and stated **before** computing the statistic, (actually the criterion is stated earlier, even before the investigator begins his research) and (2) the investigator does not deny the existence of difference "up to" the predetermined level are not satisfactory evidence of a true, unusual or meaningful difference. This same logical order and predetermination of a point at which change is acceptable and meaningful must of necessity be a vital part of the task of evaluating efforts in Education.

The process of selecting or developing devices and collecting data—the measurement component—exists as the third step in an educational evaluation sequence. Adams and Torgerson state "Evaluation that is not based on reliable measurement may be misleading . . . on the other hand, measurement that does not lead to evaluation is of little value."[5] From the Adams and Torgerson's statement quoted above, two important points can be inferred about the concepts of evaluation and measurement: (1) they must be used in an operationally dependent fashion if either is to have meaning or value and (2) they are not synonymous concepts but are, in fact, conceptually independent, having separate and identifiable characteristics. The progmatist may launch a modestly successful argument to the effect that the **label** with which one identifies the effort is of little consequence; that the important consideration is in the **results** of the effort. However, one need only review any major **text** on evaluation in education to find that the primary emphasis is on the measurement aspect; that the terms are used interchangeably; that educators frequently speak of evaluation only in terms of the development and administration of testing techniques. This unilateral concentration on "number producing" devices is misleading and tends to convince the educator that all he needs to do is prepare a "final exam" and he is "evaluating" his students or his teaching efforts. A group of students can be "measured" or "tested" in respect to some characteristic and an array of data can be compiled regarding the presence or absence of differences . . . but . . . unless these data can be viewed in terms of previously agreed upon objectives, as seen through supporting criteria, they remain as relatively useless bits of information. One does not **measure** the extent to which a student has progressed or changed toward an objective. Measurements can do no more than "sample" the student's behavior at one moment in time thereby supplying data from which inferences can be drawn in terms of the objectives and their supporting criteria.

The measurement component of evaluation includes all of the activities in the evaluation process concerned with the construction or selection of measuring devices. This includes the administration, scoring, analysis and recording of data and statistically oriented statements of inferences logically derivable from the data. Measurement does not include the application of data, nor the drawing of inferences re objectives, nor the making of comparisons beyond that which is indiginous to the testing process and the statistical work-up in the terminal phases of measurement. The application of the findings, the making of judgments, the drawing of inferences and arriving at conclusions as to the extent to which the objectives were or were not met is part of the evaluation process to which measurement makes a major and critically important contribution.

The implementation aspect of evaluation is much like the "commencement" of the academic world, both an ending and a beginning, the end of a long process which acts as a foundational experience for a new phase. To many, this may seem anticlimactic. However, the assumptions on which this fourth component of evaluation rests can be found in almost every decision made in day-to-day living. Having made a decision to purchase a new car, one checks every "automotive desire" which stimulated the decision. Make, model, equipment, color, price and other factors are weighed and a purchase is made. During the first few "new" weeks we drive and appraise, we "measure" the extent to which our objectives were realized. We may even be heard to say, "I'll never be without power steering again"—the evaluation component of implementation is operating, conclusions are drawn and new "criteria" become a part of automobile enjoyment. Educational evaluation must have a large measure of this same component . . . What strengths and weaknesses did the data and the inferences, the judgements and the conclusions, reveal? Education is a never-ending process! Evaluation is a "never-ending" process! The fruits of one cycle provide the seeds of change for the next cycle and the implementation component is that aspect which utilizes the results of evaluation.

In this brief paper the author has pointed to the existence of a process which can be viewed in terms of an "ideal type" construct—an Evaluation Paradigm. The discussion led to an investigation of the concepts of evaluation and measurement. It was shown that a distinction exists but that the two are inextricably related in a dynamic fashion in the application of the Paradigm.

Four major components were revealed: 1) the formulation of OBJECTIVES which are unambiguous, behaviorally oriented, practical, measurable and in harmony with broader institutional goals. 2) the development of CRITERIA which serve to identify minimally acceptable levels of behavioral change. 3) the selection (or development) of MEASUREMENT devices with which samples of student behavior could be taken to produce data from which inferences could be drawn and 4) the IMPLEMENTATION of the findings in re-defining the objectives, the criteria, the measuring devices, the structure, the processes, the entire educative effort (if necessary) to better achieve the desired ends.

The evaluator should have the entire evaluation Paradigm in mind when approaching the problem of evaluation and should initiate the evaluation process at "ground zero" in the teaching-learning sequence.

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PANEL: HOSPITALS

Max Michael

INTRODUCTION

Our charge is to examine the state of the art as of the moment, to define problems as we see them and hopefully to arrive at some recommendations for solution of these problems. The speakers on this panel will address themselves to four areas (1) relevancy of materials, (2) utilization of existing basic materials, (3) evaluative experience with one particular medium, and (4) an overview based on experiences of the Veterans Administration. For a frame of reference, let us attempt to define a teaching hospital as will be used in this panel. To some this indicates a university operated institution. To others it is any hospital that conducts graduate training programs. I prefer to think that any hospital that has patients, and physicians and nurses to take care of those patients must be a teaching hospital if it is to provide good medical care. There are many hospitals without interns and residents that have active teaching programs. Thus, for our purpose we will devote our attention to the non-university hospitals.

Our panelists have a bit of anxiety over the fact that much of what they will present was discussed at yesterday's meeting. I will attempt to allay their fears by reminding them that Dr. Sharry told us that repetition is a cornerstone of the learning process. Finally, we will not delve into the various hardwares nor the various techniques of presentation. Rather, we plan to attack broad issues and try to indicate some of the problems as we see them. Your active participation in the discussion and the sharing of your problems will do much to help us propound significant recommendations.

Max Michael, Jr., M.D., *Assistant Dean, College of Medicine, University of Florida, Executive Director, Jackson Hospitals Education Programs, Inc., Jacksonville, Florida*

ARE MATERIALS RELEVANT TO THE JOB?

Theodore G. Kummer

I had occasion to speak with an old colleague a few weeks ago while organizing my thinking on the subject of Relevance of Audiovisual Materials to Hospital Medical Education Programs. He told me about how he had spoken on the same subject a few years before: How he had told it like he saw it at the time; and how no one would speak to him for the next two days. I hope some of you will speak to me after hearing my remarks.

To some extent, this partially previews my feelings about the relevance of audiovisual materials generally, but particularly in as highly specialized an area as medical education. For several years I had the opportunity to participate to some degree in the selection of topics for medical motion pictures and in their planning. I also saw more medical films than I care to remember; so I feel I have some background upon which to make my observations. In my observation, far too many medical films and other audiovisual materials are not as relevant to the job as they might be.

Now let me define what I think "the job" is. In my belief, it is the business of giving residents, interns, staff physicians, and other hospital personnel information with which they can do a better job of caring for patients, the primary mission of the hospital and its personnel at all levels.

That implies that you have to assess what the participant, the learner if you prefer, needs to know. What he feels he needs to know more about, what he wants to know more about (and usually these will be synonomous), and what you feel he needs to know based on demonstrated patient care deficits.

This means that the planners of programs need to establish communication with the recipients of the information to make an assessment of the curriculum needs. They have to devise ways of better identifying what the needs and wants are.

I am often asked what can be done to improve the motivation of physicians to attend planned programs. You are familiar with various stick and carrot, punishment and reward theories. I suggest to you that motivation will take care of itself in large measure, if the programs you plan have practical, everyday, utilitarian value to the attendees. And that means that the program ingredients, the subject, the audiovisual aids, and perhaps most important, the discussion, needs to be relevant.

I am sure that each of you can cite several examples of situations in which you either saw a film, or perhaps even ordered it and planned the program, and got the reaction: ***"That was a beautiful film, but it had nothing to do with us at this hospital."*** The film and the program were not relevant.

I'd like to suggest today a few of the things that I believe can improve the relevance of audiovisual materials. And this, I believe, has general application to any educational program. I believe that the message is most important, not the media.

First, I hope you will agree that most successful audiovisual materials demonstrate adherance to sound educational theory. Service training films, for all of their jokeable connotations, are an excellent example of sound instructional devices. They are "how to" oriented. They state the premise, they expand on it and

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prove it, and they re-enforce by restating it—the recapitulation. So, whether it's an army training film, a film on clinical medicine or surgery, or a para-medical training film, it should be "how to" oriented.

Second, most successful medical films focus on frequently reoccurring problems. A good film on a frequently encountered medical emergency will outdraw one on an esoteric, though fascinating, research project every time. Again, the practical application is what counts. Films on physical diagnosis have traditionally been extremely popular. My guess is that they are so popular because this area employs so much of the art of medicine and everyone is interested in improving his capability for making the soundest possible judgment.

Third, since most films cannot be all things to all people, they should be short—between 10 and 20 minutes long. They should certainly stand by themselves, but they should be employed in a supportive way within the context of the planned conference so that the variations in application can be brought out by the attendees in the discussion.

The success of single concept films speaks for the advantage of keeping a film as short as possible. Single concept sales films, for example, have a proven record for delivering the message quickly and effectively.

Fourth, audiovisual materials should be well-designed and pleasing in appearance. Slides should be kept simple, demonstrating only the most key points. Distortions in color and distasteful design will subvert the best teaching film. When we have the rare opportunity for communicating an idea, of teaching or re-enforcing a skill, we dare not jeopardize that communication with distractions.

Animation techniques have proven very desirable in communicating complex ideas. Even cartoons, in their place, have proven useful. An Obstetrician-Gynecologist colleague at a university in the northwestern sector of the country has put a whole course on single concept, animated cartoon film. This has proven tremendously successful in teaching medical students and in postgraduate education.

Now, I think you will agree that audiovisual devices can enhance medical education programs by simplifying complex topics, emphasizing key points, and broadening the learning area beyond the in-hospital conference room. I'd like to turn for a few moments to suggest a few things that I believe will help you make your presentations more relevant to the needs of your audience.

First, you need to accurately and thoroughly identify the objectives of your program. You need to realize whether or not you are intending to present facts and knowledge, an information transfer, or whether you are intending to accomplish a skill transfer.

Then you need to select an appropriate film based on the objectives you intend to fulfill. Be sure that the selected film approaches the needs of the program attendees as nearly as possible. Be sure to preview the film, and by all means, don't use it if it does not approach the needs of your audience. This is perhaps the more frequent cause of non-relevance—the program planner fails to, or doesn't have time, to preview the film before hand. I suggest that, if the film does not, in your opinion, approach the need of your audience, you are doing your audience a disservice by showing it—you are wasting their time, and you are doing yourself a disservice because the audience will think twice before coming to your next program.

Next, I suggest that you have to create an atmosphere most conducive to learning before you show the film. You should preview what the film portrays and why the audience should see it—why this knowledge or skill will help them in caring for their patients. At this point you can draw on your communications, surveys, and audits on need. If you have a relevant film, you will remind your audience of the relevance and they in turn will make appropriate identification.

Just as poor design or bad color within the film, itself, causes distraction, you should eliminate as many external distractions as possible. Be sure the room temperature is satisfactory. Be sure you do not have competition from noisy air conditioners or outside construction. Be sure everyone can see the screen.

Last, in a well-planned program, you should be prepared to fill in the gaps in the discussion following the film presentation. I mentioned earlier the fact that films cannot be all things to all people. It is in the discussion that the adjustments in application can be made. You should provide an atmosphere for give and take, cross sharing of applicable experiences, and comparison with in-hospital situations. This will maximize the potential for relevance to all.

Let me review briefly.

I'd like to see audiovisual materials made more relevant to the job. The producers of materials and the program planners, the users, need to give more attention to finding out what the learners' needs are—what the learners need and want to know more about, and what they should know more about as demonstrated by their patient care deficits.

Then the audiovisual products need to be how-to oriented, as practical and utilitarian as possible.

They should demonstrate adherance to sound educational theory.

They should focus on common problems. The investment in these materials should be made in areas where there is the greatest need.

They should be short and they should be well-designed.

Then, in planning programs, the objectives should be identified and accurately defined. The film should be chosen on the basis of those objectives and it should approach the needs of the learners as nearly as possible.

The film should be previewed and discarded if not relevant—if it does not approach the needs of the learner.

An atmosphere most conducive to learning should be established through description of why this knowledge or skill will help the learner and through the elimination of external distractions.

Last, a good discussion should be planned to insure that all participants have a chance to establish identification of their needs with the new knowledge or skill presented.

I believe these things will improve the relevance of the materials to the job and to in-hospital presentations.

TO BETTER USE THE TRIED AND TRUE

Norman S. Stearns

The primary purposes of this presentation are:

I. To outline major considerations which lead to appropriate choices and utilization of specific Audiovisual and Communications Devices, and

II. To call attention in summary fashion to the types of "A-V-C- Devices" available and appropriate to use in community hospitals.[1]

I. The following are Major Considerations which will lead to a proper choice of A-V-C devices:

A. Clearly define the specific purpose or purposes which the use of any Audiovisual Aid or Communications Device is to serve/ Examples are:

1. Provide or assist in providing didactic instructions
2. Transmit information
3. Answer questions
4. Sell something as with so-called "action messages"
5. Heighten audience interest in subject matter by use of audiovisual aids during lectures, rounds, conferences and other in person presentation format
6. Enhance distribution of information through appropriate media selection
7. Save time of teachers and/or audience participants
8. Aid in patient care as with TV and/or audio monitors, or, X-ray, ECG and other special techniques for patient observations as well as information transmission and recording.

B. All Audiovisual and Communications Devices in use involve considerations of Manpower and Facilities at the point of receipt. The specific device used must serve the originators and the recipients each of whom may have special problems and at times may reverse their roles so that originators may become recipients and vice versa as with two-way telephone, radio or television.

Points of Origin..Points of Receipt or Delivery

Lecture Room
Auditorium
Operating or Delivery Room
Patient Area
Library
Laboratories
X-ray, ECG or other Departments
Physician Offices or Homes
Cars, Buses, Ambulances

Norman Stearns, M.D., *Director of Postgraduate Institute, The Fenway, Boston, Massachusetts*

C. It is desirable or perhaps essential that there be established at the outset means for continued or repeated evaluations of what is accomplished. There should be provisions for critical review of the content of material presented when the objective of the total exercise is education! There should be thoughtfulness assessment of the adequacy of equipment and facilities before A-V and Communication devices are purchased, installed and utilized, and, provisions for ensuring adequancy on a continuing basis!

D. All persons concerned with the activity should be clearly in agreement with overall objectives and willing to consider the selection of the proper A-V-C tool for the job without personal prejudice! If education is the goal all concerned with the activity should agree that the A-V aids utilized will not be used "as a crutch for poor or lazy teaching!"

E. The following factors are worth considering: Cost in dollars; Cost in time; Ease of utilization; Space requirements; Personnel requirements. The input should be worth the gains when alternative approaches are available!

II. Types of Audiovisual and Communications Devices Available (Select the Proper Tool for the Job).

1. Slides — Projectors — Screens — (Viewing area)
2. Films — Projectors — Screens — (Viewing area)
3. Audio Tapes – private or open listening devices
4. Television (Closed Circuit) (Intra mural and Extra Mural) Open Network and Broadcast Network; Local; Scrambled
5. Radio – open network or closed network
6. Telephone – closed network usually
7. Printed Material – book and journal collections in a viable local LIBRARY providing access to Area and Regional Library materials and ultimately to the National Library of Medicine. N.B. MEDLARS, TWX, WATS, SYMBIOSIS
8. Photocopy Machines
9. Programmed Instruction Material and Devices – simple text to complex teaching machines
10. Exhibits
11. Demonstration Materials e.g. – X-ray; ECG; Path Specimens, etc.
12. Medical Juke Box
13. Computers (and computer systems as e.g. – PAS, BCD, HUP, ARBUS, WHIP, QUEST).Can be used for Education and for Patient Care or both at once!!

Every community hospital regardless of size should have an organized program of continuing education for all members of the Health Care Team.

While teaching and learning may go on at any time and at any place, there are certain times and certain places which may facilitate each of these processes. All programs of continuing education should therefore have some organizational framework upon which a structured program can be built. The objectives of the overall educational program and the elements which make it up should be clearly defined. There should be adequate considerations of curriculum, faculty and students. The proper use of Audiovisual and Communication Devices may enhance

curriculum and should positively affect faculty and student participation.

At the very least, every community hospital should provide adequate space for educational activities including a meeting room or auditorium and a separate library facility. Meeting rooms should be suited to their specific purpose and should not serve multiple functions such as dining, reading or record keeping. Minimal Audiovisual Device requirements for meeting rooms include the following, all of which should be kept in good repair and with spare parts available for emergency use as needed:

1. **Blackboard with chalk and eraser**
2. **Slide projector for 2x2 slides**
3. **Slide projector for 3¼ x 4¼ slides**
4. **Motion picture projector for 8mm and/or 16mm film**
5. **Screen**
6. **Flashlight or stick pointer**
7. **Easily lowered window shades which properly darken the room**
8. **Safe storage space for equipment and accessory supplies**
9. **X-ray view box**

Every community hospital regardless of size should have a Functional Medical Library which contains a basic but comprehensive collection of current textbooks and journals appropriate to practice in medicine, nursing and the allied health professions. The concept of the core-library[2] including the core collection and core services, should be investigated "as a tool of information provision and education" since it "can be applied immediately and universally."[3]

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THE VA AND AV

Harold M. Schoolman

My colleagues on this panel demonstrated great altruism and tried to anticipate what's bothering you and offer you solutions for your unvoiced problems. I find myself in a little different position, neither altruistic nor compassionate. I'm going to tell you what's bothering me and try to demand of you some solutions. I think that the topic is so enormous that we do a great disfavor by assuming that broad generalizations can be made. There are words that we use like "education," and "training" that seemingly have broad applications but, as the speakers have pointed out, when we get down to examining what it is we're trying to accomplish there are vast differences between undergraduate medical education, continuing education, graduate education, the training of allied health people, task oriented training, etc. The educator would like to conceive of it as some kind of active process by which a teacher influences the thought processes of the student, a concept which I find very illusory. In the last fifteen years I've come to the conclusion that teaching is an intransitive verb and that only learning is an active process; but that's an argument I'd like to avoid.

The Veterans Administration operates 166 hospitals in the continental United States and Puerto Rico. Eighty-four of them have major affiliations with medical schools. We are also affiliated with almost all of the dental schools and numerous universities, colleges, junior colleges, schools of nursing, etc. and so on down the line. In addition we have some 80 hospitals, which are geographically remote from medical centers, and we have all the problems of production and distribution that each of you may have, only multiplied by 166. So every time you think of spending $5,000, as I think of it, the cost to us is nearly a million. So the operation is such that we're intricately involved throughout the country in many of these activities. One of my colleagues, Mr. Shamaskin, on another one of these panels, is going to detail some of the programs in which we're involved and you can read about them in the proceedings. I see no need to simply recapitulate.

Now I'd like to talk about some general problems and take a moment to make some observations which reflect our current thinking, not necessarily immutable. For example, I'd like to comment on what I consider to be the role of video tape in the future, in terms of thinking about the various processes with which we're concerned. I have decided from this morning's discussion that there is no possibility for standardization of video tape by the industry in the foreseeable future. I think, therefore, and for other reasons, that the use of video tape as a national distribution system is impossible, impractical, and of no value. I think the future of video tape lies in the instant replay type of teaching and the recapturing of materials for later playback if it may be important. Although we have a program in 30 hospitals involving the distribution of video tapes, this is a type of program which I don't think has a future.

The questions that I would really like to spend some time on have to do with the logistics of production and distribution of softwear, and not on what it is going to be played. In the first place, what is evident is that no single hospital, university, federal unit or state, or any other agency, has the fiscal, professional or other

Harold M. Schoolman, M.D., *Director, Education Service, Veterans Administration, Washington, D.C.*

resources to do this job. As a matter of fact, the cost of doing this job for the whole medical health field would be astronomical. If one conceives of the creation of a library—and I believe this is the appropriate way of looking at this—if one conceives of a medical library with audiovisual access to scientific material across the whole breadth of the health field, we're talking about costs of hundreds of millions of dollars, probably building up to a billion or more. The current operation is totally inefficient; it is so inefficient that even in the minimum areas in which we are active, it is excessively expensive. There are only two ways in which we can go, it seems to me. The first and the desirable area, as I see it, is exemplified by a program in which the Veterans Administration has been involved, namely, the creation of single concept films for dentistry. We have now produced 50 single concept films at an average cost of slightly over $1,000 a film, which is about a third of the cost anybody would quote you. The reason we have been able to do it is because we have had the contribution of the professional knowledge of professors of dentistry and of the dental schools, and all we have paid them are the expenses which are necessary to bring them into a studio to work with us. They have contributed, and the dental schools have contributed their expertise and their knowledge. We have made the production ourselves. We have made it available through the American Dental Association and it will be available to everybody at cost.

The production of any area of material can only be done economically if two things are possible. First, is the development of a core of talent for the detailing of what is to be accomplished with this particular set of material and, therefore, the laying out of the technical aspects and the technical expertise in the production of such material. Secondly, it is necessary to have access to all available material which would make it unnecessary to reproduce footage already done. Thus there needs to be a depository to which all of us have access, of the raw footage of all catalogued audiovisual material. There needs, therefore, to be a cataloguing of what is available in the field. Dr. Rosenow got an unsatisfactory answer yesterday and gave an unsatisfactory answer this morning to this problem. The fact of the matter is there is no single place to which one can write to obtain information as to what is available. There are many places to which he may write and get some sort of answer. Catalogues available include NMAC, ADA, AMA and VA. The only automatic input into a recording system of available audiovisual materials is for those that are produced by the federal government. We have been working with AHA, AAMC, AMA, ADA, and others to try to bring our concern to the attention of the National Library of Medicine to ask if they would undertake developing an automatic input bibliography, recurrently updated like Medlars, to which you have referred, of all audiovisual material. We feel that the National Library of Medicine is the logical place for this.

Unfortunately, the National Library of Medicine has inadequate funds. They must seek resources in order to accomplish the purpose. Speaking as an individual physician concerned, as you are, with the future of medical care in this country, I would point out that our responsibilities cannot end by simply referring problems to agencies or institutions. Rather, we must become activists who try to make sure, if we believe something to be important, that such agencies or institutions get those resources needed to do the job. We shouldn't sit back and wait for someone to hand us something on a silver platter, because if we do then the second alternative will take over—namely, the commercial production of scientific material, leading to a medical library becoming a profit making organization.

I can't think of anything more appalling than four years from now having medical libraries operated as profit making organizations. If our concept is that materials should be universally distributed, making them available to the greatest number of people with the greatest of ease, nothing is more foreign to this than the creation of a medical library as a profit making organization. And, yet, that is the inevitable result of failure of bringing together the forces that I have indicated to produce the kind of material we need because the production know-how exists far better in private industries than it does in universities, each of which feels that it's important to get a camera and go traveling through medicine with rod and camera and produce films at every moment. We have a request from every VA hospital in the country associated with a medical center to make a film or a video tape on some subject. As a matter of fact, most of them represent the same subject. I think this is an absolutely critical point and you are the ones who are going to have to pay for this in the end, both monetarily and scientifically. You have to be the force that demands—through your societies, through your agencies, through your organizations—that this be done the way it needs to be done.

When you get to the other issues, when you get the issues of what is the material for continuing education that needs to be produced for a hospital—that's a horse of an entirely different color. We could spend another three days on that subject. You can't make any meaningful generalizations about that except maybe that you're for motherhood and against sin. I can express one concept: I don't believe there is any advantage in the transfer of information per se as far as continuing education is concerned. I believe that the only purpose of continuing education is the improvement of patient care. This is the only meaningful measure of success. I'm inclined to believe that it's more important that the physician play golf on Wednesday afternoon and thereby have a more relaxed, more receptive, more compassionate attitude, than it is for him to learn or for someone to attempt to transmit to him some information that has no relevance to his day to day activities. When you talk about the education of medical students, then you have a different problem. Here you're trying to give people a background with which they can learn, a permit to learn, a vocabulary. It's not the same thing. In regard to continuing education, there is a great need to know how to evaluate the quality of patient care and in general that's very difficult, but in certain isolated examples, it can be approached. This is another whole topic which could be the subject of a great many discussions.

Let me just summarize by saying this. I believe that the problems of attaining a successful utilization of all educational media through teaching hospitals—and I certainly agree that every hospital should be a teaching hospital—requires a consortium of action by all forces available and that to support that consortium requires a political force. There is no political force at the moment powerful enough to demand it. Those that are influential are inclined to be unconcerned—that may be the most euphemistic way of putting it. I think that you ought to become a political force. Your kids are talking about participatory democracy and about being involved. You may not quite agree about the kind of involvement that they are talking about, but I say being involved in what is presumably your profession, is really your job. I believe sincerely, that unless you get involved, unless you become a political force, that the likelihood is very, very great that the main source of audiovisual training as educational materials in this country will end up in a profit making structure. Their accessibility under those circumstances will be markedly reduced. It is not, in my mind, a meaningful justification to say that physicians can always affort to pay for it because they can write it off in income taxes. The physician constitutes the smallest audience for audiovisual materials in the whole health field. As clean up man I don't know whether I've struck out or even been in the ball park, but you've given me a chance to stand on my own soap box and I've talked about what is bothering me.

THE WIZARDRY OF TV—OR IS IT?

Lamar Crevasse

I will report our experience with open circuit educational television in its ability to attract and keep a significant following in moving into the community and the rural areas for bringing continuing education to physicians.

I will also allude to some motivational techniques to increase audience observation. We have sent questionnaires to some 2800 physicians comprising our potential viewing audience within range of four educational television stations. The programs were "Seminars for Physicians." Each physician so identified received a brochure which introduced the series, the purpose, contents, the schedule and a self-addressed return questionnaire to determine the pre-series habits and opinions relative to viewing television programs designed for continuing education in medicine. We received only a 23% response to this questionnaire. However, during the preceding year some of the physicians that were polled had used no television whatsoever related to medical education. The important motivating factor for these physicians that did watch educational television was primarily through suggestions of associates. Some 90% of the respondents indicated a desire to follow a proposed series and that the series of one hour on Tuesday, Wednesday or Thursday evening at 9:00 seemed to be the time most preferred by physicians.

The composition of our group of physicians that we were trying to reach consisted of 33% general practitioners, about 12% internists, and the rest specialists in various areas.

Subsequent to our pre-series study, we did a separate evaluation on three specific programs in order to generate a larger respondent group. This was composed of 400 physicians randomly selected from the ETV station areas listed that received specific reminders of viewing. Of the control group that received no announcements or reminders, there were very few respondents. Of the ones that received specific reminders in relationship to motivational techniques for viewing and evaluating we had a 35% to 40% response and actual 15% to 20% of viewing audience. This then led us to the technique of phoning physicians beforehand for specific evaluation of program. With this technique in four different areas, some 80% of the physicians that were reminded prior to the television series participated in the evaluation of the program.

The most important factor in generating the audience was the study's direct mail treatment with the idea of "to view" and "to evaluate." Subsequent to this, during the first week in June, a post-series study was effected for the purpose of comparison of the base line of the pre-series study and the number of physicians that were actually watching it at the time to determine the number of programs that the physicians actually reviewed, what media were responsible, and what programs would be recommended for showing in other areas.

We also sought out what factors of importance were actually incorporated into their practice and translated into better patient care. After the series, we elicited a 42% survey response of physicians actually participating or reviewing the programs. Some 60% of the physicians that had viewed the programs viewed more than six of the 27, the average being six programs for the physicians that utilized

Lamar Crevasse, M.D., *Coordinator, North Florida Regional Medical Program, Gainesville, Florida*

this vehicle. The direct mailing and personal contact was the most important thing responsible for their viewing.

Their recommended types of programs are those that are pertinent to clinical practice with some didactic presentation rather than general panel discussion. The facet of what was incorporated into their practice from the series was difficult to evaluate as most of the responses were too vague to incorporate into any meaningful data.

We can summarize and say that in our experience moving into a semi-rural area with a third general practitioners, 12% internists, that we elicited only a 23% response to our sampling of some 2800 physicians prior to the beginning of an open circuit educational television series, and that of these respondents, approximately 80% had viewed no television whatsoever directly related to medical personnel. Suggestions from their associates were primarily responsible for viewing of those who viewed prior to the series. Some 90% of physicians polled thought that educational television was worthwhile and agreed to follow the series. The follow up reaction to the usefulness of this showed that we could motivate approximately 35% of the group to watch with specific reminders for certain programs . . .With direct call reminders some 80% of the physicians could be motivated to view and evaluate educational television. No significant information was obtained in relationship to what was actually incorporated into the practice. We feel that this like other TV series indicates that a significant audience could be generated through direct mail reminders and personal contacts.

MEETING THE NEEDS IN CONTINUING EDUCATION

Introduction

Norman Tucker

I am Norman Tucker with the Continuing Education Branch of Physician Manpower at the National Institutes of Health. Our charge this morning is to discuss the needs and meeting those needs for the utilization of audiovisuals in continuing education. Inasmuch as there are three other simultaneous groups covering basic science, clinical medicine, and hospitals, we are thus limited to the discussion of the needs for the practicing physician. So let us try to confine our discussions in that direction. Our format this morning is quite simple. We will take the first phase and allow each of the panelists a maximum of ten minutes for a presentation which will basically cover the state-of-the-art as it relates to their particular associations and agencies and it's a very good cross section, as you will soon see. After a coffee break, we will then come back, take off our coats, roll up our sleeves, and start a discussion. This discussion is to be directed toward meeting the needs of audiovisuals for practicing physicians, and I would be most hopeful that this group would be able to come up with some very good conclusions and recommendations.

Norman E. Tucker, P.E., *Education Consultant, Continuing Education Branch, Division of Physician Manpower, Bureau of Health Professions Education and Manpower Training. N.I.H.; P.H.S.; D.H.E.W.*

THE CHALLENGE AND OPPORTUNITY PROVIDED BY VIDEOTAPE IN MEDICAL EDUCATION

Richard S. Burdick

In Robert Lowell's play, *The Old Glory: Benito Cereno*, Captain Delano tells of once seeing an English actress who wanted to look deep and intelligent, so she read Plato and Benjamin Franklin, but still looked like a moron. So they told her to forget it—to think of nothing. She took their advice, thought of nothing—and looked like Socrates.

The participants in a national conference on the use of audiovisuals in medical education don't need anecdotes to make the point that appearances are deceiving. However, it's possible that some of those present may not fully have reflected on an essential point inherent in the communications medium to which we commonly are exposed and to which many of us, in turn, expose our fellow men. I'm speaking of television. Television not only created the generation gap, it may even help to bridge it. The shock waves of the social and cultural explosions that began a split-decade ago and which only now are starting to become fortissimo, have rocked us, racked us, shook us up, frightened us, pulled us uptight, and freaked us out; but because the evidences of what's happening are daily depicted on image orthicon tubes in living rooms, family rooms and barrooms throughout the country, people—whether they like it or not—are becoming informed. And when we learn about something, understand it, know it for what it is, we learn to cope. Since so much of TV viewing is done in a domestic environment, involving each confused, groping, alienated member of the family group in an enforced, integrated microcosm, it just may be that, given world enough and time, we'll find that the family that views together "glues" together. Whether or not this proves to be the case, the case already has been proven that television can, in fact, inform and even teach, and even the most resourceful academic researcher would be hard-pressed these days to convince McGeorge Bundy and his associates at the Ford Foundation that while they were up they should give him a grant for a feasibility study.

As with all good things that derive from heaven, nature and man's devising, how we use them is of more importance than the fact that we have them. And it is a fact that many people involved in the educational applications of television do not fully appreciate the unique opportunities provided by the medium. Whichever side of the Marshall McCluhan fence you may be on—and if you're saddle-sore from intellectual fence-straddling, you're not alone—there is little argument about the Professor's claim that when it comes to television, the medium is, indeed, the massage. Whether or not it has a message, of course, depends upon what is fed into it, but everybody who views it is rubbed one way or another by television. For those of us who are interested in its uses in medical education, it therefore is important to know whom we wish to massage with the message, and how to do it with maximum effectiveness. This involves advancing with the times and using those technologies that are serving to shape and change the times.

And as the popular folk song puts it—"the times, my friend, they are a-changerin."

For example, in 1936, the chemicals in your body were worth 98 cents. A

Richard S. Burdick, *Director of Network Affairs, The Network for Continuing Medical Education, New York, New York*

Northwestern University biochemist recently calculated that at current, inflationary prices, you're worth $3.50—an increase of 257 percent.

Now my particular professional interest is in videotape, and its uses in education and instruction. I know that some of you use videotape in your work and that all of you probably are familiar with its many applications in education. Some hair-splitters may question whether television can be a genuinely educational medium, rather than an instructional resource. But education and instruction are semantical *Bobbsey Twins* (Mae West Story). However, I want to identify for you the essential point to which I previously alluded, inherent in the used of **videotape**, as opposed to the conventional and traditional uses of **film**.

You may well ask, "What's the difference, really? Aren't they similar components of the same visual medium?"

They are not. The essential point about the television medium is that it is a **broadcasting facility**. Videotape is an instrument of television, a product of the medium, and germane to it in a way that film is not. It is in the tradition of film, for example, for it to be shown in a theatrical or semi-theatrical setting. In the case of educational film, theatricality is implicit, rather than overt; but the psychological effect of viewing previously filmed images projected from behind, onto a clearly defined rectangle is constant and inescapable.

Film can be transmitted via television, of course; in fact, it's one of the most effective interruptions of itself on the *Late Show*, for dog foods, cat foods, laxatives, storm windows and station breaks. But it also can be projected on walls, bedsheets, cardboard—you name it. I recently watched a psychedelic commerical being shot on a New York sound stage, in strobe lighting, in which a film of marching soldiers was being projected through pink smoke onto the naked back of a nervous girl model. Videotape, however, can be seen only on television; videotape **is** television; it finds its most effective utilization as a **broadcasting** facility.

I have no intention of using this occasion as a forum for professional proseletyzing; but as an illustration of what I mean, I would like briefly to outline the primary service of the organization with which I am affiliated: The Network for Continuing Medical Education. NCME is a videotape service to medical centers and hospitals throughout the United States and Canada. It was formed four years ago, as a new kind of professional journal—a television journal—providing a medium of informational and instructional exchange, on videotape, among physicians, nurses and the health professionals. Six hospitals and seven medical schools were the initial participants. Today, NCME serves more than two-thirds of the medical schools in the United States and several hundred hospitals in the U.S. and Canada. It serves them with a one-hour videotape reel of telecasts for physicians, distributed every two weeks throughout the year.

NCME is **not** a library service; participants automatically receive the videotape "issues," every two weeks, in the same way that subscribers receive copies of published journals. The medical institutions are encouraged to use videotape to become, in effect, their own "broadcasting facility." That is, not to play the videotape just once or twice during a two-week period to an invited audience, but to play each reel daily, or several times each week, in the manner of a television service. Thus, busy physicians are provided with a variety of opportunities to see programs of interest to them.

The journal concept is further enhanced by the inclusion on each reel of several unrelated medical subjects. TV guides are sent to each institution, for advance distribution to every physician on staff. The current NCME reel, for example, contains the following telecasts (READ FROM TV GUIDE).

A physician with a limited amount of time can select the subject specialty of interest to him. If he is provided with a choice of viewing times, he is not required to be a captive audience. Further, the institution's concern with the numerical factor of attendance becomes less acute. TV viewing in the home is commonly limited to one, two, or several persons at a time; not to a group audience. By presenting the videotape reel frequently, at a variety of viewing times, attendance at individual telecasts becomes less important than the cumulative audience reached over a two-week period.

There is an encouraging growth in the recognition and acceptance of the validity of this broadcast, videotape-journal concept.

(EXAMPLES)

NCME programs are limited to the professional audiences for whom they clearly are intended; it is an audiovisual **professional journal**, not a consumer periodical. In producing a telecast in obstetrics, for example, we probably would not include the device, however meretorious—but more appropriate to the *Reader's Digest*—of a certain Philadelphia obstetrician who puts a tiny rubber-stamp mark on the tummy of every mother-to-be who comes under his care. One curious husband used a magnifying glass to examine the stamp mark. It read: "If You Can Read This Without A Magnifying Glass, It's Time . . ."

The technical challenge of a videotape service to hundreds of institutions is a considerable one. I'm sure that all of you are familiar with the lack of standardization among the videotape configurations of the various quadruplex and helical scan models. In order to serve all institutions desirous of utilizing this videotape journal with maximum broadcast effectiveness, we equipped our New York technical center with the machines of every manufacturer, in the 1" and 2" configurations. This, of course, was a major capital investment; and the annual cost of producing, duplicating and shipping the hundreds of individual copies of each videotape "issue" in the various technical configurations to the respective participants every two weeks, is the kind of figure you read on the sides of boxcars. But I don't need to tell you that television is **expensive**, and **education** is expensive, or that together they are worth it, if you have the support. And we are fortunate in having as sponsor, Roche Laboratories, a division of Hoffman-LaRoche, Ltd. (a pharmaceutical concern). There are other, unsponsored sources of medical videotape services with which we acquaint NCME participants, because we firmly believe in the link-and-chain theory, and that what helps one serves to strengthen the means to reach the educational objective which we all seek.

Increasingly, institutions are implementing the total broadcast capability afforded by the television technology. Among the foremost physician-educators, who have recognized these advantages is Dr. Richard D. Judge, Associate Professor of Internal Medicine and Medical Television Coordinator of the University of Michigan Medical School, Ann Arbor—a participant in NCME. In an article in *Visual Medicine*, Dr. Judge wrote that, "A majority of medical and dental schools and a large number of nursing schools have been using some form of television in their acedemic programs for several years. Duke, Temple, Jefferson, Utah, California (San Francisco) and Kentucky are among the schools which have made noteworthy pioneering efforts." "Why use television?" asks Dr. Judge. He then answers the question, listing its advantages in relation to other specialized audiovisual tools used in medical teaching—such as lantern slide and opaque projectors, movie and overhead projectors, micro-projectors, and audiotape. Television is more complex and costly, but its electronic constitution offers some unique advantages:

Image magnification is perhaps the most valuable advantage. Television is a superb magnifier, and combined with a zoom lens, it can provide the flexibility of field size required by most clinical and basic science demonstrations. The magnified image is immediately available, and it is animated.

Image multiplication is another major advantage. As classes grow, the ability of television to multiply an image instantaneously by a factor of ten becomes increasingly important. This capacity is limited only by the number of display units available. Combined with magnification, such multiplication can bring each learner into intimate contact with the instructional material presented.

Image transport—the capacity of television to communicate visual material over a wide geographic area—is another dramatic advantage. As medical centers grow and teaching units multiply, a well developed network can tie all points together in a single system. The Cardiac Study Unit can be brought to the Medical Staff Conference, the Gross Pathology Laboratory to Surgery Grand Rounds. The Physiology Laboratory can be next door to the Pediatric Conference Room, even if one happens to be in a building a mile or two from the other. Distance becomes immaterial.

Image storage and **reutilization** are greatly simplified by the videotape recorder. Electromagnetic tape makes this both convenient and economical.

Audiovisual integration—the combination of television with other audiovisual devices—is also possible if television is fully employed. The medium becomes a funnel through which the instructor may pour information in the form of models, lantern slides, filmstrips, X-rays, or electrocardiograms. He may fuse these with patient demonstrations, pathologic demonstrations, or surgical procedures. The result can be an uninterrupted flow of information to the learner which, thanks to electronic switching, is relatively free from distractions.

All of these advantages derive from the utilization of videotape in its generic environment: television. Television is a viable communications medium that offers challenge and stimulation; and the kind of representation we have here in Birmingham, today, sends out waves of commitments to these emotions. "Life is action and passion," wrote Oliver Wendell Holmes. "A man must share that passion and action of his time, lest he be judged never to have lived at all."

Television is where the action is.

Another favorite quotation of mine is from William James: "If things ever are to move upward, someone must take the first step and assume the risk of it."

My colleagues and associates—present and absent—have taken the first steps in the evolution of an important new form of educational utilization. The risks involved are legion and classic—support; acquisition of genuinely educational materials; the motivating of superior instructors, production experts, resource persons to contribute or to participate—but where future steps lead depends upon those who are already walking and those who will join the march, and how together we utilize the unique opportunity afforded by television. Television. Two words: **Tele**, to show; and **Vision**, to see—hopefully, to see wisely.

I thank you for the courtesy you have shown me in permitting me to express my point of view. I hope that to some extent it may have stimulated your own thinking in this medium. However, I do think that after all I have said, I should apologize for my professional inconsistency in coming to you "live," rather than on videotape.

CAN AUDIOVISUALS SATISFY THE DEMAND FOR INDIVIDUALIZED CONTINUING EDUCATION?

Ruth M. Davis

No one really wants to be out-of-date, behind the times, technologically obsolete or uninformed. It's just that the price you have to pay to avoid these backward states is going up.

Not so, scoffs the cynic. Paperbacks are everywhere and they are cheap. And, there are two channels of educational TV—not very clear but still viewable. Anyone with a desire can learn anything he wants to at practically no cost.

With this line of reasoning we lull ourselves into a pleasant stupor of deep contentment, we educators, teachers, Congressmen, librarians, administrators, physicians, technicians and students. We say to ourselves, "When we're ready to, we can learn that subject," or "If he wants to, he can learn; I don't have to worry about him any more."

Thank goodness for those authors and publishers putting out those paperbacks. Bless those ETV programmers. They're solving lots of our problems. Besides, look at those advertisements on computer-assisted-instruction in *Medical World*. The last education issue of *JAMA* had 102 pages on courses available in continuing education. Someone is looking out for us. They just won't let us get out of date. We can relax.

Even on a National level we're being looked after. There's that new Lister Hill National Center for Biomedical Communications. We heard a talk on it last week. They're figuring out how much it will cost to keep us educated. Maybe they'll do it with satellites. Who knows—they do, we guess.

Of course there's Bill Jones to whom we were talking last night. He was rather upset. He's the best cardiologist in town. But those new techniques for angiography were something he had wanted to learn about right away. He had heard about them from Dr. Evans who had just spent a year with Dr. Harry A. Smith who had developed them at Harvard University Medical School. Bill had several patients whom he thinks could be helped by them.

Bill called Dr. Smith on the telephone to see if he could come up here and lecture on New Techniques in Angiography. Dr. Smith said he was just deluged with requests to talk and could only accept a few. We were too small an audience so he suggested instead that Bill come to Boston and learn by working with him. But Bill can't. He's our only cardiologist within 35 miles. He can't afford the time away from his practice. Besides, he spent six weeks away last year and can't afford the expense so soon.

Dr. Smith did say he was giving a C.E. course next April 20–25 at Atlantic City and maybe Bill could go to hear him then.

Bill was persistent though. He said that ten months was really too long to wait for some procedures that, although new to him, had been developed and tried successfully eighteen months ago. Maybe Dr. Smith had some written material or slides that he could borrow.

It looked as if he had finally hit paydirt. Dr. Smith told him that there was indeed an article on the subject. He had submitted it to the *American Heart Journal*

Ruth M. Davis, Ph.D., *Director, Lister Hill National Center for Biomedical Communications, National Library of Medicine, Bethesda, Maryland*

ten months ago and it would be published next month. He would send Bill a Xerox copy. But the article was not oriented towards putting his procedures to work. It was a description of the research he had performed and a summary of his experimental work. Sensing Bill's disappointment, he hastened to add that this type article was essential to continuation of his research grant from the National Institutes of Health. Certainly research has to be reported on for other researchers to read. After that, one concentrated on the applications to practice.

Dr. Smith also recalled a whole box of 35 millimeter slides that his house staff had collected. There was only one copy of the set which was currently on loan to Dr. Gray who was on vacation. When Dr. Gray got back next month Bill could borrow the slides and make a copy if he wanted to. There was no way to describe the slides . . . well . . . how do you describe pictures? Dr. Smith had never thought about the problem of deciding whether you wanted slides before you borrowed them.

And, oh yes, the Chief of Staff of the hospital had come in one morning and gotten permission to film—no, to videotape—Dr. Smith applying the procedures to several patients. He had a notice that indicated it was a two inch videotape made by NCME.

In answer to Bill's next question, he admitted that there was no discussion or explanation of the procedure that accompanied the videotape. He normally was there himself when it was shown. But it was good, even so, and had been suggested for use in one of the local continuing education courses run by the Council on Teaching Hospitals. So evidently you could learn by watching it. He would get his staff to send it to Bill.

Dr. Smith assured Bill that he appreciated his interest and that his only problem was **time**—time to continue the applications to practice, to lecture on them, to teach them by example and to write them up. He had to give first preference to practitioners in his area. He just couldn't travel everywhere. Although it sounded like Bill was being penalized for living in western Massachusetts rather than Boston, that really wasn't the case. It was just circumstances. Travel and communication took time that **he couldn't afford**.

The whole incident got Bill to thinking. Actually he told us he didn't just think. He first got mad and then frustrated and finally worried.

He passed on his concern to us and we have spent a whole weekend wondering about ourselves, our careers, the **cost of learning** and, how to find out what we should learn.

We decided that lifetime learning certainly was an individual responsibility. Its effect was widespread. It wasn't right that our patients couldn't have the benefits of new practices and new drugs just because they lived here in western Massachusetts. We were just as good practitioners when we graduated from medical school as were our friends now living in Boston. But were we now? We certainly weren't when it came to using up to the minute diagnostic techniques. And that hurt our patients more than us. Besides, they were paying just as much for older procedures. It's a good thing they weren't aware of it.

We put some of our thoughts down to clarify our thinking. Maybe you can help us. Here they are.

Education is a very personal process. It is strongly dependent upon individual traits such as motivation, self-disciplinary habits, leanings towards listening rather than reading or v.v., retentivity, concentration and the like. For professionals, maintaining currentness and knowledge in their fields is an essential ingredient of professional self-respect.

Graduation from college marks the point at which education is no longer the primary occupation of an individual. Education then becomes competitive with career advancement, earning a living, improving one's social position, family life and recreation. We call it continuing education in recognition of its never-ending nature.

Continuing education then, plays a different role in our lives than does the formal "within walls" education of primary and secondary schools and universities. It need not and in reality should not mimic the forms, traditions and practices of formal education. But it does. It is generally simply an extension of the education offered as a full time occupation during our younger years.

Continuing education remains group-oriented in the tradition of formal education. People holding full time jobs are asked to congregate in varying size groups at varying locations at different times throughout the year. The trappings of university education are adhered to. Whenever possible, classrooms empty during the off season or weekends are used.

The continuing education class graduate is sent home with some combination of self-written notes, teacher-provided outlines, packets of material references and hard-copies of vugraphs or slides are used. An unspoken doctrine of such courses is that the product with which the student returns home must be sufficiently incomplete to guarantee its uselessness within six weeks. This is possible because of the normal forgetfulness of a professional involved in many career activities.

The teacher is the center of continuing education just as in college. The fifty-year-old professional is assumed as dependent upon the interpersonal worshipful contact of teacher and student as is the eighteen-year-old. The high probability that now the teacher is thirty years old and the student fifty has not altered our conviction. Perhaps the dependence is still there. We don't know because the situation has not been subjected to cold objectivity.

We might ask ourselves why the processes of education shouldn't adjust itself to its clientele. Why doesn't continuing education reflect our "grown up" needs rather than just continuing the practices we liked in our less mature days?

Perhaps we should isolate the needs of professionals with full time careers or at least the more important needs that impact on education. First of all, there is a **real-time need for education on a selected basis**. A practitioner confronted with a number of cases of transient cerebral ischemia feels a strong need and a desire to learn about current angiographic techniques immediately. On the one hand he's strongly motivated by current interest: on the other hand, there is an immediate pay off in his practice. He'd be willing to **spend the time** required. His motivation disappears and the benefits lessen if he has to wait eight months and attend the first course listed in the Continuing Education supplement of *JAMA*.

Secondly, the individual with a career would like in many if not most instances to learn at home, that is, without having to travel. But of course, not in all instances. The **cost in time** of 10 days away from practice and family is high. The **cost in money** is not insignificant. The social and professional benefits of attending conferences and courses is undeniable. But they need not be done at the **expense of learning**. Information transfer and occasional education is a sufficient justification for conference travel. Learning is a difficult enough process to deserve some pampering in establishing the right environments and in catering to an individual's learning habits.

A third salient behavioral feature which impacts on continuing education is the desire of full time career professionals to control their time to at least that limited extent which allows enjoyment of living. Most busy practitioners place a **high premium on some privacy**, on quiet and the simple satisfaction of not having to listen to telephones or TV or radios at certain times. Continuing education should not be classified as an inconvenient, non-controllable nuisance.

Just listing these three characteristics to which continuing education should adapt shows their complete antithesis to the modus operandi of formal education. Real-time needs play little part in a full time student's behavior pattern. School away from home is the commonplace. College becomes home after a fashion for four years. Students grow in groups and privacy has in general not yet become so precious.

Continuing education then should not be molded in the form of college education. It should be characterized by:

- individualized listening and looking (audiovisual) instructional devices which can be used in a home environment
- linked audiovisual devices so that taped lectures can trigger their own visual displays mounted as slides or film strips for individual use
- directories of continuing education courses and materials which can be called up at home with subsequent placement of requests via phone or computer console
- local learning centers with individual learning facilities utilizing videotapes, self-assessment facilities and on-line access to individuals accredited as teachers in the continuing education program.

As a shopping list this is not "far-out." Some equipment that fits the need exists and is in use. Directories exist. The problem is that there are too many, and this leads to confusion. There are more than 2000 medical film guides of which 600—700 are major sources. It is almost impossible to know which one to use or why. To go through thirty directories is self-defeating. There are local learning centers in many universities, in many cases funded at least in part by the federal government. Their use, however, by practitioners for continuing education purposes is minimal.

Self-paced instruction, self-assessment and information call-up to be done at home or individually in local learning centers has generally called to mind the use of on-line computer systems. Further, it's assumed that computer utilities or time-shared systems are "here." But what does being "here" imply? Today it means a computer system which can drive around thirty-two individual remote consoles. It means planning which is aiming at 300 to 500 simple remote consoles per computer. The cost for individual instruction-like aids on these systems runs roughly $3.00 to $10.00 an hour. For simple queries of computer held directories, the cost per console hour will run about $8.00.

Many of us have been convinced that technology is not a problem. It is the other aspects of the audiovisual field that we must master. Surprisingly enough, technology is a problem. We possess good optical systems, we can do much with miniaturization, and film technology is advanced enough that we can pick out a Volkswagen at a distance of sixty miles on certain films of high resolution. Everyone knows how far we have advanced in the computer field. But we cannot yet produce an individualized hearing-listening system that allows one to pursue his continuing education at his own pace in a location of his own choosing and at a time when he has a need, a real-time need to learn a particular topical area. How can we define the stage at which we find ourselves in this development project? We know:

- It takes 85-90 percent of the original inventive effort in developing a technology-derived product to translate that product into a usable application.
- If we had the engineering and systems technology at hand there would be few people to either produce the content for our education package or to utilize it for their continuing education because of lack of training to employ the products of technology.

3

- TV is the single most powerful educational device developed in forty years. Yet videotapes are rarely exchangeable between manufacturers and therefore between medical institutions.
- Cold objectivity has not impacted on medical film and TV producers sufficiently to allow a determination of where color is essential as opposed to useful as opposed to enjoyable. As a result, decisions cannot be made on whether to sponsor or encourage a concerted industrial effort towards inexpensive hi-resolution color.
- The technology of producing content and procedures for individualized education is at a standstill. Techniques of five years ago are the techniques of today. The rate of publication in the field of educational technology has fallen off drastically since 1962.
- Constructive experimentation in the use of audiovisuals to guide continuing education has been rare. Small computer-assisted-instruction (CAI) projects $200,000 to $2,000,000 are rampant with very little useful product. Repetitive experiments have been inconclusive.
- The emphasis on content and the relegation of this intellectual endeavor to the academic community has not been followed or matched with any spontaneous movement by that community to start the large, almost immeasurable, effort needed to effect progress.
- The costs of starting, of maintaining and of introducing the necessary technology into individualized continuing education has not been even grossly estimated.

If we were now to summarize our thoughts relevant to the question "Can Audiovisuals Satisfy the Demand for Individualized Continuing Education?" they might look as follows:

It really appears that continuing education does demand an individualized approach and does by its nature demand different procedures and technology than does formal education, (college education).

The imaginative use of audiovisuals as the main thread of an individualized educational package is wanting. Audiovisuals in education conjure up pictures of large noisy projectors with burned out light bulbs or scratchy sounding tape recorders with no splicing kit when the tape breaks.

The approach to audiovisuals in continuing education has been one-dimensional in nature. People have looked at hardware or they have looked at facilities or they have looked at the content problem or they have made user need surveys. There has not been a constructive, multi-dimensional, comprehensive approach. The few exceptions validate the general observation.

The answer as to whether and how audiovisuals will be helpful in continuing education is not apparent yet. The small-scale experiments underway in the medical community primarily offer the excitment of the new, and the quick technological fix to the more minor problems. They provide no answer to the general question. If only they continue the answer will be "no." The transition from experiment to large-scale practical application has not been charted either in terms of cost, responsibility or benefits.

If the "big" technology of audiovisuals is not furthered to satisfy this demand for individualized education there appears to be nothing else to fill the gap. Computer technology is far too expensive and highly structured. The continuation of the textbook technology is inadequate. The utilization of the old time schoolroom approach seems anachronistic. We would like to give a big push to the big technology of audiovisuals. We believe that if not forcefed, or prematurely applied, it will lead to genuine and salutory improvements.

COMMUNICATIONS IN POSTGRADUATE MEDICAL EDUCATION

Thomas C. Meyer

As a consequence of the information explosion which has enveloped almost all professional and non-professional disciplines since World War II we find ourselves in a dilemma. The essence of the dilemma is time—time to read, to think, to work, time for leisure. Time is finite, but the amount of printed information crossing our desks seems infinite. The avalanche of publications, books, journals, reports and budget statements is constantly increasing. Medicine is a discipline in which great strides and advances are being made at an alarming speed for those of us merely trying to keep up to date. With these advances comes the threat of obsolescence for the physician who is already overburdened with patient care responsibilities which may take 12-14 hours of his working day. He needs time to think, time to ponder the decisions which allow of optimal care to be delivered to his patient—perhaps the difference between life and death. Moreover, he needs time to obtain the information which is going to assist him in making those decisions.

In any educational system there are controlled and uncontrolled variables. The controlled variables are such well known entities as behavioral objectives, behavioral strategies, content, presentation, media, management, feedback and evaluation. More tantalizing to those of us in continuing professional education are the uncontrolled variables which include entry behavior, environment, politics, demography, finances and logistics. These factors seem more important in many respects when dealing with physician continuing education than other professions whose fields of interests do not appear to be so wide, so diverse or so prone to rapid change. The constraints on a physician's time seem so inflexible that the Department of Postgraduate Education of the University of Wisconsin is experimenting with the means by which we might in due course be able to exert some influence over the uncontrolled variables. We have no intention of tampering with such variables as politics but there do seem to be possibilities in the finances, the environment and logistics. Individualized instruction can provide partial solutions to these problems. Perhaps it would be of value to recount some of our experiences in these attempts to find solutions for there is surely not one single solution to continuing medical education.

We have made one basic assumption that may or may not be valid. This assumption is that a student of any age, background or intelligence learns best when pertinent information is presented to him at the time when he really requires it. The motivation, time of day or night, or circumstances of his desire to learn are comparatively unimportant. Equally, the form in which he obtains the information is less important than the fact that he finds out what he wants to know. Books, journals and conferences have long been the standard means for a physician to obtain information and we have no dispute with these as the way in which a great number of physicians keep abreast of current medical thought. There are, however, individuals whose learning is greater by means other than the printed word and attendance at conferences. Therefore, we are experimenting with methods of making current, pertinent and **authoritative** information readily available to undergraduate, graduate and postgraduate students in the health professions. I

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would like to discuss briefly three methods which have engaged our attention with some preliminary evaluation.

A. Dial-Access Library

In an effort to provide physicians immediate access to current, pertinent and authoritative information a library of 88 self-rewinding cartridge tapes, each of approximately five minutes, was available to physicians in Wisconsin in the spring of 1966. These were available 24 hours a day and could be obtained merely by making a telephone call and requesting the tape. The subjects varied from life-saving measures as "The Management of Diabetic Coma" to such mundane subjects as "The Prevention of Knee Injury in Athletes" and contained subjects with as wide variation as "The Management of Bee Sting" and "Marriage on the Rocks." In essence the tapes contain core information on subjects:

1) Of emergency nature
2) Of recent discovery
3) Difficult to find elsewhere

The initial response was encouraging and with assistance from the Wisconsin Regional Medical Program we set about developing a more comprehensive dial-access library, the use of which could be evaluated more extensively and in greater depth than the count of calls received. In January of 1968 a library containing approximately 200 tapes was announced as a free service to physicians in Wisconsin. This has now increased to more than 300 tapes.

The physician can consult a brochure for the title of the tape he requires and dial into the library. His call will be answered by a pharmacist who will select the tape, place it in the machine and play it over the telephone line. The tape is self-rewinding so that when the pharmacist has adjusted the volume of the tape he hangs up his receiver and is free to go on with his duties while the physician listens to the tape. There is an automatic disconnect at the end of the tape and the system is ready for the next call. The library is located in the pharmacy where there is 24-hour coverage.

During the first two years of operation we averaged approximately five calls per day with the pattern of calls reflecting the "gimmick interest," the poorly designed brochure and the fact that only two announcements of the service were made to the physicians in the state.

Since January of 1968 we have had more rational (and expensive) means of promotion and evaluation. In addition to tabulating the number of calls, we have tried to break down the utilization of the Dial-Access Library into reasonable categories. From January 1968 through June 1969 we have received a total of 9056 Wisconsin calls (exclusive of use by Minnesota and North Dakota physicians) which is approximately 17 calls from medical personnel a day in the two stations which have been established in Wisconsin.

The breakdown of the medical calls we have received shows the service to be one with appeal to General Practitioners who are comparatively isolated from ready consultation and who have less time to utilize more established lines of reference. We have some indirect evidence that specialists are utilizing the library for consultation on subjects outside their own areas of expertise.

Time of day during which calls are received—the majority of calls are coming after 4 p.m. and we are studying the reasons for this. The obvious reasons seem to be appearing.

It is always interesting to know what subjects are principally in demand. It is of some importance, we believe, for this affords us some objective measure of subjects which are of greatest concern to practicing physicians. Table I gives an idea of the "popularity" of the tapes currently in the library. We are left to meditate on the reasons for these calls and the impact of a "catch title."

A postcard or telephone follow-up is done on selected groups of physicians at various times. To date we have had evaluations from approximately 60 percent of those who we have asked–this comprises 80 percent of the calls made to the library.

General reactions as we have ascertained them to date. Thirteen percent of the calls are for emergency information while 45 percent are for general updating of knowledge not related to a specific patient problem. Ninety percent of the physicians listen to the whole tape and 92 percent who called with a patient problem believe the content of the tape influenced their management of the patient.

So much for the Dial-Access Library. Its utilization is falling off from a high of 33 calls per day in January 1968 (first month of operation) to a low of six calls per day in August 1968. At present the average is 12 calls per day. Like everything else the cost is proportional to the sophistication of the system. Our initial simple system cost $3,000 to set up and run for 12 months but the physicians paid for the telephone call. Currently it is costing us $18,000 annually but we pay the toll charges and have a complex evaluation built into the system.

TABLE I

MOST POPULAR TAPES

Jan. 1, 1968 thru March 1969
(total M.D. calls: 8,805)

1.	Rh Negative Pregnant Patient (Latest Trends in Management)	203
2.	Emergency Treatment of Cardiac Arrhythmias	190
3.	Marriage on the Rocks	161
4.	Management of Status Asthmaticus	158
5.	Treatment of Acute Pulmonary Embolism	156
6.	Summary of Therapy of Advanced Breast Cancer	132
7.	Diagnosis and Treatment of Aspirin Poisoning	112
8.	Present Status of Treatment of Angina Pectoris	111
9.	Management of Anaphylaxis	110
10.	Immediate Care of the Acute Stroke	107

B. Single Concept Film

The second communications mechanism with which we are experimenting is the Medical Single Concept film. In essence we hope to provide improved health care to patients by making available to physicians and other health care personnel the means by which they can view procedures which have been introduced in recent years. These procedures are quite simple when viewed but seem very complex when described in a text. We are of the opinion that many excellent movies are never viewed because of the difficulty of arranging projectors, screens, darkened rooms, etc., as well as the fact that most medical films run 20-50 minutes, which a physician can rarely afford.

The Single Concept films run 6-20 minutes in a Fairchild Mark IV cartridge loading projector with a 10" by 6" screen. All the physician has to do is press a lever and the pictures and sound start immediately. He does not have to thread a film, darken the room or do anything but watch and listen. Only essential information is in the film and we believe the 6-20 minutes is well invested. This film is self-rewinding too so that if he wishes to view the film a second or third time he merely has to press the lever again.

At present we have six series of films of six each circulating among hospitals in Wisconsin. We supply the projector which is usually placed in the physician's lounge for three weeks. Two films are supplied per week and they must be viewed in that week.

Again, we are engaged in the tedious process of evaluation. It is difficult to know how many people (physicians and non-physicians) have viewed the films. We have a counter on the machine so that we know how many times the machine is turned on for each film.

This Single Concept Film Service has been enthusiastically received. We have twenty projectors circulating to hospitals in Wisconsin and even so, we have bookings for the projectors and films through June of 1970! While we wish we could extend our services to hospitals outside of Wisconsin our requests for the films are so great that we cannot go beyond the state borders at present. Possibly at some future date we can expand this service to interested hospitals outside of Wisconsin.

Present users are small hospitals, some with less than five physicians on the staff to metropolitan hospitals in Milwaukee with several hundred physician staff members. At present 47 hospitals are participating with a combined total of 3,330 physicians and doctors of osteopathy on the staffs. On return counts reporting use we know most physicians are viewing these films plus many nurses and technicians, where the medical staffs make the films available to allied health personnel.

C. Telephone/Radio Conferences

Our third approach to the problem of health education has been to try to make lectures and discussion from University faculty available on a regular, continuing basis in every hospital which desires them. The Telephone/Radio Conference was started in November 1965 with 18 hospital "stations" linked to the University by telephone. Each "station" comprises a loud-speaker, a telephone handset to communicate over the circuit, a carousel slide projector and screen. These are usually set up in a conference room near the hospital cafeteria and regularly scheduled conferences are conducted from the Medical School for various health personnel. It is in effect a state-wide party line in which everyone who has their speaker turned on can hear anything that is said from any station.

The general format involves a 30-minute lecture followed by 30 minutes of questions and discussion from any and many stations on the circuit.

Table II shows the growth and extension of the programming over the three years that it has been in existence. Essentially 13,000 individual hours of instruction were given in 1965/1966 and in the 1967/1968 academic year, 80,000 individual hours of instruction were given with neither faculty nor students moving away from their communities or their health care responsibilities.

We have made attempts at evaluating this long-distance manner of teaching in order to satisfy ourselves of our ability to transmit information which is retained by the participant.

The performance of a group of physicians in eleven separate hospitals in the state were matched with a group of medical students. Each group covered the same material on electrocardiographic interpretation with the same lecturer at the same period of the year. The only difference was that the students faced the lecturer in the classroom while the physicians never saw him. Both groups took the same pre-test, post-test, and late post-test. There was no significant difference between the two groups in the pre-test or late post-test.

TABLE II

TELEPHONE CONFERENCE CIRCUIT PROGRAMMING

1965-1966

Course	Enrollment	Lectures	Sessions	Individual Hours of Instruction
Medical Seminars	286	24	48	4,680
Electrocardiography	43	18	18	774
Pediatrics Journal Club	21	3	3	63
Social Work	236	4	4	944
Veterinary Science	119	2	2	588
X-ray Technology	217	1	2	217
Medical Technology	220	1	1	220
Pharmacy*	150	2	2	725
Nursing*	684	12	24	4,807
	1,976	67	104	13,018

**Presented by other University departments*

1966-1967

Course	Enrollment	Lectures	Sessions	Individual Hours of Instruction
Medical Seminars	326	28	56	9,128
Athletic Injuries	37	8	8	296
Shock	38	8	8	304
Pediatrics Journal Club	25	10	10	250
Internal Medicine	16	4	4	64
Fluid and Electrolytes**	75	6	6	450
Surgery Journal Club**	50	5	5	250
Veterinary Science	57	7	7	798†
X-ray Technology	176	8	8	1,408
Medical Technology	255	8	8	2,040
Social Work* **	200	8	8	1,600
Pharmacy* **	180	13	13	4,680†
Nursing* **	400	8	8	3,200
Hospital Administration**	75	4	4	600†
	1,910	125	153	25,068

**Presented by other University departments*
***Estimated; registration not completed*
†Indicates two-hour programs

Finally I would like to say a word about our plans for the future in communications. It is possible to televise live conferences if cost is no object. However, a televised conference has little appeal if the production is poor and the faculty uncomfortable in the medium. It is, moreover, a tremendous expense. We have interest in developing the potential of slow-scan television which will be carried by a telephone and a radio link from a classroom in the Medical Center to whatever stations have the reception facility. This will mean that participants at a remote station will have the live voice out of the medical center conference room and the slides, x-rays and visuals utilized in the conference as well as still pictures of the conference room, lecturer, and other speakers, etc., while the conference is in progress. Movement is not possible by this medium but it has other attributes which make it attractive to those who are interested in information diffusion.

Later this month we will be installing slow-scan facilities into Madison General Hospital which has 461 beds and a medical staff of 270 specialists and general practitioners in an urban community of 200,000 population; Richland Center Hospital which has 92 beds and a medical staff of 10 general practitioners, in a rural community of 5,000 population; St. Mary's Hospital, Rhinelander, which has 156 beds and a medical staff of 20 equally divided between general practitioners and specialists in a rural community of 9,000; and finally St. Clare's Hospital in Monroe, which has 165 beds in a rural community of 7,000 served by 48 physicians—most of whom are specialists. These four community hospitals have had three years experience with the telephone/radio conference and are well qualified to participate in live conferences going on in the University of Wisconsin Medical Center. It is our objective to assess the effect upon the conferences in the medical center as well as to determine the acceptability of slow-scan television as a method of relaying live conferences from a medical center.

Slow-scan television has many other attractive attributes among which are the storage of material on audio-tape at $5.00 an hour rather than videotape at $60.00 an hour, the fact that the system is computor compatible and therefore random access into a taped data bank by many users is a possibility, that color transmission is possible without the expense of color cameras though the transmission time for color is slower than the 20 seconds it takes to transmit a monochrome picture along a television line.

These then are some of the means by which we are hoping to reach our objective of making pertinent, current and authoritative information available to health care personnel throughout Wisconsin in the form they require it and at the time they require it.

These projects have been supported in whole or in part by the

Physicians participating in the programs
United Health Foundations
Wisconsin Regional Medical Program
National Fund for Medical Education

We are grateful for the help and encouragement that has been received from all these sources.

REGIONAL MEDICAL PROGRAM APPLICATIONS OF INSTRUCTIONAL MEDIA IN CONTINUING EDUCATION

Phyllis Carns

Approximately 360 operational projects among 40 Regional Medical Programs are presently being funded; of the 360, 200 projects are classed as continuing education and training. Continuing education projects with audiovisual components number 76.

For an operational definition we defined audiovisual as any of the following: radio, telephone, television, computer, still or motion film, audiotape or videotape. Library activities were also included since one or more audio or visual medium is usually associated and because they are documentary. We, in turn then, state that these media are instructional when used in continuing education, training or demonstration care activities. It is the applications of these media for instructional purposes in continuing education among various Regional Medical Programs, that I have been asked to speak concerning.

I will discuss these activities under nine categories. There is nothing sacred about these categories; they are simply what I chose to work with in charting awarded audiovisual proposals from our regions. In some instances an arbitrary decision had to be made in labeling a respective project as audiovisual. I can only hope that the information I have extracted from the maze of papers constituting these some 360 projects is fairly representative. As I discuss the categories of funding for audiovisual projects please bear in mind they encompass only what the Division of Regional Medical Programs has funded; they are not a summary of the total medical activity across the nation.

Under the category of radio or telephone, Albany RMP has provided funds for the expansion of the two-way radio network originating at Albany Medical College. Formerly 24 hospitals were a part of the network; now the service has been extended to 57 hospitals. Adult education tele-lectures are also being planned for reception at 24 high schools.

At the University of Utah School of Medicine the Intermountain RMP has its administrative locus. An existing two-way radio system was expanded from 11 to 21 hospitals encompassing all major communities.

Thirty sites are receiving two-way radio lectures in the Washington-Alaska Region as a continuing education activity originated under RMP.

Among 46 hospitals in the Western New York Region a two-way telephone network provides a link with the University at Buffalo and Roswell Park Memorial Institute for transmitting ECG's over dataphones as well as receiving continuing education programs.

Missouri RMP is expanding its two-way telelectures region-wide reaching 80 hospitals. They are using speech compression equipment to make lecture recordings available, as well as the accompanying 2x2 slides, as library materials in remote hospitals.

The Rochester Region is offering 'round-the-clock' cost-free telephone service as a clearinghouse for cancer information.

Several activities fall under the category of television. In California the

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California Medical Television Network (CMTV) has been expanded under RMP. They are now broadcasting and distributing videotapes among some 115 hospitals in 18 states. The broadcasting signal is scrambled.

Another system using the scrambled technique and also the 2500 megahertzian band is the Community Medical Television System in the Georgia Region. Originally the system interconnected a number of institutions within a 25-mile radius of Atlanta. Presently this network is being interrelated with the continuing education activities of the Medical College of Georgia in Augusta. Tapes from both these originating sites are transmitted also over ETV to 41 hospitals throughout the Region.

An existing open-circuit TV network in the Intermountain Region is now broadcasting 50 percent of its programs in the categorical areas. In addition TV consoles have been placed in 12 major community hospitals in the Region as a self-instructional teaching aid.

Washington-Alaska established nine receiving sites in Yakima hospitals for TV continuing education courses. Line follow-up is conducted by Seattle area physicians after each course.

The use of an ETV network to connect the University of Connecticut and Yale Medical Centers to originate TV programs for regional hospitals is being developed by the Connecticut RMP.

Scrambled home telecasts in cardiology are being transmitted to 125 physicians in the Metropolitan D.C. Region. This is a pilot study to determine the feasibility of conducting continuing education courses by sending scrambled signals to private homes. Earphones are also attached to the TV adaptor in each home to amplify heart sounds.

Ohio Valley has a small operational grant to develop interconnections among their three medical university TV facilities and community hospitals.

The computer is a popular medium for use in continuing education. Electrocardiographic diagnosis of arrhythmias is one of ten computer-aided-instruction (CAI) courses being developed by the Washington-Alaska RMP.

Under contract we are also funding CAI research conducted by the Ohio State Region. Ohio State University professors and staff from four regional hospitals planned and developed software which was to reflect local needs in continuing education.

Arkansas RMP is designing a five-week CCU course for nurses with a computer module simulating patients in various conditions.

The computer is being used for arrhythmia recognition and data retrieval in a CCU nursing course developed by the New Jersey Region. New Jersey is also conducting computer analyses of implanted pacemakers and offering subsequent consultation to regional physicians.

Indiana RMP is using a computer link among 12 community hospitals and the Indiana University Medical Center to conduct continuing education conferences, permit data retrieval and establish health care research units. Also being studied is the feasibility of using a computer alarm generation and data discrimination system.

Kansas is attempting to centralize health data within its region by computerizing information.

The computer is also aiding the Michigan Region to centralize a health data collection. In addition they are developing a multiphasic screening system and conducting a study of drug analysis by means of the computer.

A computerized fact bank is being established by Missouri to assist in the early detection of heart disease, cancer and stroke. A network of terminals is available to physicians for the dissemination of this information and for ECG analysis.

Some regions are producing 8mm single concept films as a means of continuing education in the hospital setting. Wisconsin is rotating approximately 40 films and projectors among 60 hospitals for this purpose. Washington-Alaska and New Jersey are also producing single concept films for hospital use. Filmstrips placed in a cassette are being produced and distributed among community hospitals and medical centers in the Metropolitan D.C. Region.

You've heard much about the dial access library—and so have the regions! These four, six minute audiotapes enjoy a substantial amount of popularity since they can be accessed by simply dialing either a local exchange number or long distance direct dialing through a toll-free Wide Area Telephone Service line. Wisconsin was the innovator of this method of continuing education three years ago. It was expanded under RMP funding to include tapes in the categorical areas, and they now have a library of approximately 300 tapes. The Northlands and North Dakota Regions have negotiated directly with Wisconsin to use their library facilities. New Jersey has purchased a number of Wisconsin tapes as the core of their library and is producing some locally. Central New York RMP is also establishing a dial access library as is New Mexico, also with the purchase of Wisconsin tapes. Indiana and the Mountain States RMP have obtained a portion of the Wisconsin tapes. Missouri has purchased Wisconsin tapes and is studying the feasibility of a completely automated library by means of computer.

Several regions are establishing hospital learning centers incorporating a variety of software formats, such as audiotapes, videotapes, 8mm single concept films, 2x2 slides and filmstrips. These regions include Albany, Intermountain, Kansas, Rochester and Tennessee Mid-South. Albany is also conducting a study wherein they have produced records consisting of single topic information for medical juke-boxes which are placed in hospitals for physician use.

Under information centers I have placed projects which appear to be documentary in nature. Several regions are disseminating written materials on the latest concepts in the categorical areas, developing profiles, registries and serving as a reference information center for a respective region.

Being indecisive about where some projects would fit, I created a multimedia category. Central New York is inviting nurses for training from small communities to the University Medical Center at Syracuse to increase their skills in the categorical areas. Software utilizing various media formats is being used.

New Mexico and Oregon are conducting circuit programs in continuing education using multimedia.

Various teaching aids are being used by North Carolina for a regionwide cardiopulmonary resuscitation program to train more personnel in emergency procedures.

Washington-Alaska was funded to create an audiovisual resource unit to produce software utilizing various media to meet regional needs.

Rochester RMP is incorporating several media in an educational program relating to the diagnosis and treatment of cardiac disease.

Colorado-Wyoming is establishing a prototype system of videotape exchange for closed circuit TV between the University of Colorado Medical Center and the Denver Medical Society Library with transmission to two adjacent hospitals. In addition they are planning to produce single concept films, slides, and filmstrips to be placed in hospitals which have indicated interest.

New Jersey consulting teams travel to hospitals to assist in establishing tumor conference boards. Audiovisuals are provided in the continuing education endeavor.

Central New York is augmenting existing instructional materials with various media for physician education and nursing education particularly in small hospitals.

To evaluate the utility of the circuit course method to increase screening for oral cancer, Washington-Alaska is using the programmed instruction and accompanying slide kit written by Sheldon Rovin at the University of Kentucky School of Dentistry.

A coordinated curriculum with audiovisual components for physicians and allied health personnel is being developed by the Mountain States.

Oklahoma is creating a prototype medical education center in an intermediate size town to disseminate information to smaller communities. Videotapes, audiotapes, programmed instruction and films are to be used.

The last category is designated libraries. The Washington-Alaska Region is establishing a community medical library at Anchorage.

Emory Medical College and the Medical College of Georgia are coorperating to provide interlibrary loan and copying services to medical students, residents and practicing physicians in the Georgia Region.

The Intermountain Region is developing a stroke information library and telephone consultation service.

North Carolina is undertaking to bring the medical library facilities of its three medical schools into one working unit.

Arkansas RMP is providing a WATS line to expedite library services of the Arkansas Medical Library to the Region.

Connecticut RMP has a library activity which is attempting to extend the library resources of the Region to the health practitioners.

Kansas RMP has an Office for Library Services with a staff of five who act as consultants to hospitals desiring to establish library services or upgrade existing ones.

The Maine Medical Center Library services are being extended to the Region, free to all physicians.

The three medical school libraries in the Ohio Valley Region are cooperating to extend services region-wide, as is the Oklahoma Medical Center library for the Oklahoma Region.

A regional health science information center and communications network is being established in New Mexico.

This has been only a skeletal overview of RMP funded operational projects which have some measure of audiovisual components. Presently negotiations are being conducted for an additional number which were funded as a result of the National Council action in June.

AUDIOVISUALS AS MEDIA FOR CONTINUING EDUCATION IN THE HOSPITAL SETTING

Robert B. Shamaskin

In a world of constantly increasing knowledge in the health fields, it is incumbent on any medical care institution to maintain an active and effective program in continuing education. There needs to be a planned program which uses all of the available armamentarium to bring the latest medical, scientific and medical administrative knowledge to those who provide treatment to the sick or disabled.

Fortunately the means by which continuing education can be delivered to hospital personnel is constantly increasing through the application of educational principles to new technological developments in education.

In the next few minutes I.would like to mention a few of the programs which are being conducted in the Veterans Administration in which we are employing audiovisual equipment and techniques in the delivery of continuing medical education.

I. Videotape, 8mm Cartridge Load, Guest Lecture Program

The Veterans Administration, through contract with the Medical Television Network of the University of California, has just concluded its first year of an educational program which brought, over a period of 52 weeks, a series of 36 selected 1" helical scan video tapes and four personally delivered or "live" lectures to each of 30 VA hospitals in the western half of the United States. *(Slide No. 1)* Most of these hospitals are not actively affiliated with medical schools and are located in areas remote from medical teaching centers.

In planning this program, the hospitals involved were each provided an opportunity to indicate subject preferences from synopsis of fifty taped programs. The subjects of the live lectures were coordinated with those of the tapes and provided the basis for extended interchange between staff members, guests and lecturers. This program also established a VA-Medical Television Network library of tapes on medical and nursing subjects which is available on call from any of the participating VA hospitals. In addition to VA personnel staff members of the local medical communities were encouraged to attend and participate in these programs. The response was very enthusiastic.

We are continuing this program with some expansion and variation. Beginning in October, 1969 sixty *(Slide No. 2)* VA hospitals will begin receiving programs of the type I have described. These hospitals are located throughout the U.S. with the exception of the eastern seaboard, Kentucky, Ohio and West Virginia. The sixty hospitals will be divided into four groups with fifteen hospitals in each group. *(Slide No. 3)*.

dark blue pins 1. Will receive 36 programs on 1" helical scan videotape and will be provided with four guest speakers.

Robert B. Shamaskin, ***Chief, Program Management Division, Educational Service, Veterans Administration, Washington, D.C.***

red pins 2. Will receive 36 programs on videotape but no guest speakers will be provided.

yellow pins 3. Will receive 36 programs on 8 millimeter cartridge loaded films and will be provided with four guest speakers.

light blue pins 4. Will receive 36 programs on 8 millimeter cartridge loaded films but no guest speakers will be provided.

In addition to general statistical studies, data retrieval and behavioral change studies, the evaluation of this program will include a comparison of effectiveness of media (8 millimeter film and videotape) and their effectiveness when used with and without guest speakers. The evaluation research will be planned and implemented by the division of research in medical education of the University of Southern California School of Medicine.

II. Single Concept Films as Self Instructional Medium *(Slide No. 4 – Blank)*

We have found that 8 millimeter single concept motion pictures in color and sound using cartridge loaded projectors are effective instructional media largely because of the developments in the projectors used to display the films. I refer to the fact that there is no threading or rewinding of film; the projectors may be used at any time and do not require a darkened area. This medium of presentation provides an effective instrument for self-teaching and self-study. *(Slide No. 5 omit)*

The Dental Training Center of the Department of Medicine and Surgery of the Veterans Administration has produced 90 single concept films in the last two years and 26 more films are currently under production. They deal with such subjects as oral surgery, periodontia, prosthodontia, endodontia, oral diagnosis, preventive dentistry and dental materials.

Many of the nation's outstanding dental educators and clinicians serve as subject matter experts in connection with the development of these films. They prepare outlines, define exactly what is to be communicated and demonstrate their techniques and concepts in front of the camera. These individuals are on the staffs of several dental schools. *(Slide No. 6)*

The films have been used in varying numbers at VA hospitals. During the fiscal year ending July 1, 1969, 661 cartridged films were distributed among VA hospitals. At present 1052 more cartridges are on order for additional distribution.

A program to make all VA produced dental films available at cost to dental schools and dental practitioners is now being consummated.

III. Micro-Link System – Duke–VAH Durham

Under its granting authority the Veterans Administration has provided a grant to Duke University Medical Center for the purpose of establishing a system of dual television channels in the 2500 megaherz band to transmit medical information between Duke University Medical Center and the VA Hospital at Durham, N.C. *(Slide No. 7)* This activity is also directed toward enhancing medical education in the medical community within a 25 mile radius of the Duke-VAH Durham complex and to groups of practicing physicians and other

VA and community hospitals *(Slide No. 8)* outside a 25 mile radius, utilizing video tape facilities.

IV. Closed Circuit Cable System – University of Nebraska–VAH's Omaha, Lincoln and Grand Island

The Veterans Administration has approved a grant to the University of Nebraska *(Slide No. 9)* under which the Nebraska Psychiatric Institute will participate with the VA hospitals in Omaha, Lincoln and Grand Island in establishment and operation of a closed circuit television linkage between the Nebraska Psychiatric Institute and the three VA hospitals in Nebraska. Some thought is also being given to adding the VA hospital in Knoxville, Iowa to this network. The system, when completed, will be two-way and will be used for exchange of medical information and continuing education covering a variety of activities, including, but not limited to -- *(Slide No. 10)*

1) teaching rounds and conferences in general and highly specialized areas;
2) lectures and demonstrations in subjects such as practical clinical pharmacology,evaluation of new therapeutic agents, peritoneal dialysis, therapeutic uses of blood and blood products, uses and limitations of pulmonary function studies and clinical laboratory diagnosis;

other activities will include:

3) development of a single tumor board for all participating stations; and
4) instantaneous consultation including utilization of full time faculty in specialties such as psychiatry, neurology, anesthesiology, hematology and endocrinology;
5) also, electocardiograph, x-ray electroencephalogram and isotope scan interpretation. *(Slide No. 11 – blank)*

V. Coatesville Bus

The Veterans Administration has provided a grant to Jefferson Medical College which will promote maximum utilization of teaching time to effect optimum teaching benefits from the affiliation between Jefferson Medical College and VA hospital, Coatesville, Pa. This is being accomplished by the development of particular specifications for *(Slide No. 12)* a bus and its subsequent operation and maintenance. The bus has been built for the purpose of conducting teaching sessions, with seating arrangements *(Slide No. 13)* and audiovisual accessories suitable for small group discussions and individual study. This "seminar room on wheels" carries 30 passengers and will operate between Jefferson Medical College and VAH Coatesville, Pa., *(Slide No. 14)* a distance of 92 miles round trip which takes about 2½ to 3 hours. It will operate 4 to 6 days weekly.

VI. Teleconsultation – A New Medical Information Exchange System *(Slide No. 15 – Blank)*

The Veterans Administration and Massachusetts General Hospital are engaged in a project which will explore various aspects of teleconsultation services than can be used between the teaching staffs of Massachusetts General and VA Hospital, Bedford, Massachusetts. *(Slide No. 16)* This project will include the development of electronic circuity and supportive services to demonstrate the potentialities of teleconsultation as a device for continuing education and treatment. It will also involve a study and cultivation of factors which foster interprofessional teleconsultation. This will be accomplished through various means including, but not limited to, (1) a periodic series of written questionnaires directed to all participants, (2) in depth interviews with selected participants, (3) complete computation of usage patterns and (4) specific evaluation of each teleconsultation.

This will be a two-way micro-wave interactive audiovisual system of about 15 miles between points. Because of terrain conditions a repeater micro-wave station will have to be maintained between Massachusetts General Hospital and VAH Bedford.

The feasibility of teleconsultation will be studied in various health professions and specialties including, but not limited to, radiology, psychiatry, medicine, neurology, dermatology, nursing, social work and dietetics.

VII. Uniform Distribution System for Dissemination of Medical Information

We have been concerned with the substance as well as the means of delivery of information via audiovisuals. We have combined these interests in a pilot program conducted through agreement with the National Medical Audiovisual Center of the National Library of Medicine.

This program's objective is to determine, through development of carefully controlled educational programs, (initially at ten VA hospitals) the type of material most needed and the most effective means of distribution of medical information within the Veterans Administration (with emphasis on remote institutions) and to the total medical community.

Initially it was necessary to determine existing needs for audiovisuals at VA hospitals and the potential utilization of audiovisuals for continuing education, as well as to locate and reproduce for distribution, certain existing audiovisual resources. In this connection the National Medical Audiovisual Center was asked to survey the hospitals selected for participation in this program. Based on the information obtained from the survey and the educational profiles developed of staffs at each of the hospitals, equipment was purchased as needed and educational materials in the amount of about 160 programs were collected, reproduced and distributed to these hospitals through the facilities of the National Medical Audiovisual Center. These materials cover a wide variety of interests and specialties. The materials distributed use four media, i.e., videotape, 16 millimeter film, 8 millimeter cartridge loaded film and 35 millimeter slides with sychronized sound so as to provide a basis for comparison of usage and effectiveness in presentation of material.

To further provide an appreciation of the utilization of audiovisuals in continuing medical education, a five day workshop dealing with this subject was conducted at the National Medical Audiovisual Center in May, 1969. This was attended by two appropriate persons from each of the ten initial stations involved in this project.

Based on the ultimate findings of this project, determination will be made as to the media and methods of distribution of audiovisual materials on a system-wide basis.

VIII. Conclusion

I think we can agree that delivery of information for purposes of continuing education in the hospital setting is vital to effective patient care. The importance of investigating and evaluating the spectrum of audiovisuals as means for delivery of information is therefore significant.

Our experience has led us to believe that there are few audiovisual devices without some merit. Too often, however, a policy of "over-kill" is employed. That is, a highly sophisticated device is used when a simpler one will do. Therefore, if there is any conclusion that may be drawn relative to audiovisuals in continuing education, it is the fact that selection of any audiovisual device must be considered in concert with the type of information being delivered, the student receiving the information and the situation or circumstance in which the information is to be received.

THURSDAY, AUGUST 7, 1969

AFTERNOON SESSION

On the afternoon of August 7, 1969 no formal meetings were held. The participants were allowed this block of time to view the Demonstrations, Scientific and Professional Exhibits, which were on display at the Medical College and the Parliament House. In addition, there were conducted tours of certain facilities in the Medical Center Complex.

For listings of Special Demonstrations and Technical Exhibits see pages 169 and 171, respectively.

FRIDAY, AUGUST 8, 1969

MORNING SESSION

Engineering Building Auditorium

Chairman: Dr. Margaret S. Klapper

PANEL REPORTS AND DISCUSSIONS

(The reports were made in a variety of audiovisual modes to demonstrate the use of these modes.)

BASIC SCIENCE AND AUDIOVISUALS
Dr. Robert Stone

Dr. Stone's report was made in a most appealing manner using the conventional lecture approach combined with appropriate slides.

(HERE FOLLOWS MS OF REPORT)

THE USE OF AUDIOVISUALS IN CLINICAL TEACHING
Dr. Francis Wood

Dr. Wood's report was presented by means of a television tape projected on large screen in the auditorium. It consisted of an artful combination of segments made at the panel discussion and a commentary taped later in the day by Dr. Wood.

(HERE FOLLOWS MS OF REPORT)

AUDIOVISUALS IN TEACHING HOSPITALS
Dr. Max Michael

Dr. Michael reported on live television (large screen projection) in the auditorium. The report originated in a room nearby; the point being, of course, to demonstrate the technique.

(HERE FOLLOWS MS OF REPORT)

MEETING THE NEEDS IN CONTINUING EDUCATION
Mr. Norman Tucker

Mr. Tucker presented his report by means of the conventional lecture with appropriate slides and a magnetic sign board.

(HERE FOLLOWS MS OF REPORT)

BASIC SCIENCE EDUCATION AND AUDIOVISUALS

Robert S. Stone

In accordance with conference plan, this report will utilize the anachronistic mode of live, person-to-person direct communication with nothing intervening between us except intermittent puffs of hot air. I hope that the intimacy of this interchange will not be embarrassing.

In fact, the possibility that we might someday come to such an awkward state of affairs was foreseen many years ago. In a now almost forgotten science fiction novelette written in 1909, E.M. Forster of *A Passage to India* fame described a civilization he expected to evolve. Forster described a time when people would live in individual cubicles in vast honeycomb cities beneath the surface of the earth. Each cubicle would be tied to a total life support system supplied from some vast central machinery. At a time when the wireless was just being developed, Forster anticipated electronic transmission of sound and light images as well as air conditioning and packaged prepared meals. Personal contacts between individuals were seen as becoming rare and highly discomforting—being limited to such a few necessary occasions as direct fertilization or bodily illness. The cities he imagined opened onto the earth's surface through vents called "vomitories" and from these orifices also issued airships for occasional necessary travel between cities. The external, natural world was visualized as strange and hostile to man, a prospect that appears increasingly real and imminent as we continue our unchecked, headlong rush into total pollution of atmosphere and waterways.

As seen by Forster, an individual in his cell would be endlessly occupied in electronic communication with friends throughout the world whom he had never met in person, or attending lectures via incomprehensively complex networks. There would be a desperate search in Forster's foreseen world for "ideas;" any real thought at all that could be exchanged between jaded and effete, emotionally bland vegetating humans.

As projected by Forster, the civilization comes to a creeping but at last violent end because a few souls with sparks of individual and personal initiative still remaining, escape to the surface, sabotage the intricate central machinery and seek to begin a new life in which the natural vigor of mankind will be restored.

Since reading that story a week or so ago, and simultaneously beginning to think about this conference, I have been haunted by the premonition that perhaps there is just such a cabal of audiovisualists abroad in the land determined on reducing the mass of us to similar vegetating beings locked in carrels everlastingly enveloped in electronic sight and sound. I have even supposed that our three other relatively clear sensory channels would soon be usurped by the activities of a National Association of Gustatory, Olfactory and Tactile Communication Engineers.

In my alarmed state of mind, the first day of this meeting was not reassuring. As the virtuosos of the electron came on stage we were indeed subjected to an audiovisual overkill that even did not fail to resort at one point to the elicitation of a conditioned reflex to stimulate our salivary glands. I suppose we can be grateful that the appeal was not made to different smooth muscle reflexes evoking emetic or

Robert S. Stone, M.D., *Dean, The University of New Mexico School of Medicine, Albuquerque, New Mexico*

other sphincteric responses. Compressed speech indeed! Have audiovisually generated hypnotic instruction, subliminal stimulation, audiotapes during sleep, and ingestion of powdered central nervous system RNA been adequately explored as applied to medical education? Where, oh, where has my little dog gone—but his tail hás seemed over much with us.

However, now I am pleased to report on the basis of the panel discussion yesterday morning on Basic Science Education and Audiovisuals that there is hope for the world—audiovisuals have problems! In addition, a human teacher fully in control of his media and channels of communication, programmed through more than 20 years of subject matter teaching experience, constantly updated by reading journals and talking to colleagues has been discovered alive and well in Bozeman, Montana. Furthermore, we heard some attenuated signals from other surviving teachers here and there who are making audiovisuals their tools, not their masters.

The panel's first speaker, Dr. William Walter, Professor and Head of the Department of Botany and Microbiology of Montana State University, described the television based system he used in undergraduate student instruction.

Professor Walter showed us the example of the subject matter specialist performing at once as producer, director, editor and actual teacher. The course he teaches in which extensive use of live and taped television is made is taken by about 890 students each year.

The hardware and facilities Dr. Walter uses are high quality but relatively basic and simple. He is entirely dependent upon students majoring in the Department of Film and Television for studio crews, and he apparently has a minimum of engineering help.

The general format he employs is live studio presentation generated two blocks away from the two student laboratories as the initial class presentation for each day. Succeeding presentations each day are by video tape for as many times as required by enrollment and section organization during that academic quarter.

Logistic considerations prevent extensive rehersals before class, but Dr. Walter and his fellow teachers have developed sufficient familiarity with their total methodology to turn this apparent deficiency from a handicap to an advantage. Scrupulous attention to feedback from students and from both administrators and academic peers who have monitors available to them permit modifications of syllabus and script each academic quarter as appropriate. Dr. Walter is by no means locked into an elaborate Hollywood scale technological tour de force that can hardly be updated with less than an all-out expensive mustering of resources and people. Instead, Dr. Walter can simply re-edit his script, adding, substituting or modifying charts, models or demonstrations as needed and begin again fresh each semester.

Dr. Walter uses several interesting devices to preserve vividness, liveliness, spontaneity and flexibility in the actual teaching sessions. These devices include: attention attracting class opening scenes taken from *Laugh-In*, a space vehicle blast-off, iconoclastic irreverent portrayals of the instructional staff or campus news bulletins, and the imaginative use of student pacers in the central studio—analogs of the studio participants of commercial television—as interactors with the instructor. In addition, Dr. Walter employs direct telephonic interchange with students in the laboratories and has developed electronic response devices which permit individualized and collective quizzing with immediate return of correct answers to students.

The second panelist, Mr. Melvin Shaffer of the Medical College of Virginia showed us the application of television on a truly grand and highly professional scale. In Mr. Shaffer's establishment both classroom use and individualized study carrel availability of videotaped material through ten channels from central control are featured. Mr. Shaffer's staff is in absolute engineering control, while faculty and students are in absolute control over programming. Mr. Shaffer characterizes all equipment in his application as having been made "faculty proof." Much care has been given to limiting faculty technical participation to perhaps the throwing of a single switch to activate an entire classroom system.

Impressive engineering skill has also gone into the development of effective portable units for the presentation of such special materials as roentgenograms, dynographic traces, or other physiological recording apparatus, microscope views in full color and the like.

At the Medical College of Virginia, an extensive telephone system places students and faculty in ready communication with television central control and unseen technicians load videotapes or alter systems' characteristics with prompt responsiveness. Mr. Shaffer gave us no hint that a pneumatic tube system would soon be delivering nutriment and carrying away wastes from each student study area in classroom or carrel, but such a suggestion may yet appear in someone's grant application.

If any of you are seriously interested in examining an absolutely superb demonstration of what television and simple, carefully self-study sets of printed syllabic with accompanying carousel slide sets can offer to medical education, I urge you to go and see for yourselves at the Medical College of Virginia. The primary advantage seems to be in gains in student-faculty ratio without deterioration in the quality of teaching. Excellent and extensive self-study material apparently is available to students at all times with all of the good consequences to be expected from that.

Dr. Merlyn Herrick of the University of Missouri School of Medicine at Columbia next told us about an easily portable, special purpose "computer" which would make CAI far more widely available. The advantages of this device as specified by Dr. Herrick lie in meeting the following criteria: "The system must be sufficiently inexpensive that enough terminals can be afforded to provide a functional terminal-to-student ratio. The system must be sufficiently reliable and free of down time that each student can be assured of having access to the system within a reasonable time span. And, third, the system must store its programs in a readily accessible manner so that each terminal can have access to all programs at any moment without scheduling. It is also desirable to have the system operational throughout most of all of the 24-hour day."

The little "computer" Dr. Herrick told us about provides up to 300 viewable frames of 35mm film available through preprogrammed branching logic as complex as any we are likely to use for some time in CAI. In addition, a supplementary attachment provides random access to a carousel slide set and another attachment random access to audio tape. The entire system can be had for perhaps $1500.00. The purchase of a special camera and precision aligned mount permits at home production of the master programmed photographic reels.

Choice among live alternatives in response is permitted on each frame presentation. Utilization of categorical choice in a hierarchy of levels permits possible answers rapidly to cascade to 25, 125 or even higher if sensible.

The logic of the "computer" and its memory can provide corrective loops and even hold the student entrapped in such a loop until he can provide a sequence of errorless responses. A counter can be added to quantify the number of frames required by different students to progress through a particular instructional or testing sequence.

Mr. Louis Audette from the Yale University School of Medicine next described to us his concept of what we came to call in later discussions, the "mini module," or "bit bank." It was Mr. Audette's view that the Audiovisual Resource Center ought to geneologically catalog from the vast amount of bulk source material available to it, a large number of mini-units of instructional material. It was Mr. Audette's contention that individual faculty members would readily be willing to call upon the Resource Center for any such items for a topic discussion. The faculty member would then himself supply verbal cement or glue to provide continuing among the unit components. Thus, the individual style of the instructor and flexibility to respond to the needs of the special occasions would be preserved, but advantages of using audiovisuals would also be obtained.

In the discussion which terminated the session, there was much said relative to this concept. The panel members and others in attendance speculated about steps that might be taken to make audiovisual materials more readily available for exchange among users. While some expressed enthusiasm for central clearing houses, coordinating agencies or comprehensive catalogs, others doubted the real practicality or feasibility of such approaches in the immediate future. Some supported the idea that particular professional specialty or academic discipline oriented groups might assume custodial, evaluative and distributive functions within particular subject matter areas. The opinion was also offered that the key to the problems of flexibility and exchangeability could be found in greatly increased production of single concept, mini-modules which could be strung together, or restrung in different combinations like beads for various situations. No clear consensus could be developed within the group.

THE USE OF AUDIOVISUALS IN CLINICAL TEACHING

Francis Wood, Jr.

The question I faced in setting up this panel was how to best separate the topic among the four panelists. After some discussion, one suggested approach seemed to be the most logical.

The first topic to be discussed was the input: How does one determine the needs of the potential student (i.e., the consumer)? What needs can be best met through the use of audiovisuals? Dr. Dyson has addressed himself to "The Input Requirements."

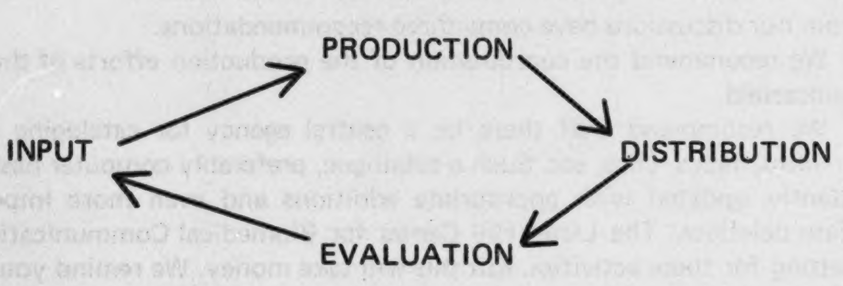
When the input is elicited or received, this leads to the second topic—production. This problem area includes not only the technical aspects—the hardware and how it is used—but also the personal aspects: How can we get university professors to produce something sophisticated in audiovisuals? How can we squeeze money out of academic administrators and gain support for a coördinated audiovisual production unit? Mrs. Johnson discussed "The Production Opportunities."

With and following production, distribution problems become our third area for discussion: How can produced audiovisuals most effectively reach the people who need them? Who should be responsible for ironing out the incompatability problem that exists for example in areas of TV tape or 8mm sound film—a great impediment to distribution? How can the costly duplication of production effort by two centers with similar goals be prevented? Colonel Caras presented "Some Thoughts on a National Audiovisual Delivery System."

Finally, how can we evaluate what we have done? Has our audiovisual message reached a receptive and motivated audience? Have we used the best audiovisual medium? Is the lesson we are trying to teach remembered—does it alter the behavior of the viewer? Dr. Husted's topic was "Evaluation: How to Identify Progress."

And, of course, the cycle is complete (Figure 1) as we move our evaluation into input for our next audiovisual production. Can we do better than our last effort?

Figure 1



Francis C. Wood, Jr., M.D., *Associate Professor of Medicine, University of Washington, Seattle, Washington*

REPORT OF HOSPITAL STUDY

Max Michael, Jr.

We come to you on live television this morning. I can't say we do so bright-eyed and bushy-tailed, but I can tell you we have survived Birmingham in August. It is quite difficult from our standpoint, being closeted away from our audience for we lack the feed-back that a "performer" wants and needs. Let me emphasize that this remote television presentation is a demonstration. Consider, if you will, that not only is there an audience in the adjacent lecture hall but also five similar audiences in remote areas—we might even call in a satellite for transmission.

Our panel addressed itself to the use or non-use of audiovisual materials in teaching hospitals. And herein was our first hangup—defining a teaching hospital. We did have agreement, undoubtedly not unanimous, that any hospital with a patient and with a physician taking care of that patient, must be a teaching hospital. For sake of brevity, and to permit more time for discussion, I shall summarize each panelist's presentation in one sentence. This does not mean they didn't cover far more; this only represents my thoughts as to their major point of departure.

Mr. Kummer's presentation underscored the point "know what you want to use the materials for."

Dr. Stearns' presentation left us with the thought that there are basic existing materials that can be used to advantage and often are not.

Dr. Crevasse indicated that we should pay attention to methods of making physicians assimilate materials.

Dr. Schoolman, our able cleanup man, was alarmed because of the enormous expense involved in the audiovisual field and believes that a consortium of talent should take over the production and distribution of materials—otherwise, commercial interests will take over and libraries could well be run for profit.

In the ensuing discussions, several cogent points were explored in depth. There was general agreement that access to available material is difficult and that when retrieved it is often not relevant to the task and is of unknown quality. Moreover, the volume from which to select is overwhelming. The number of films on cardiac resuscitation must nearly approach the number of patients requiring the procedure. And we might ask, how many of them are relevant, are updated, are well produced and indeed the purpose for which they were produced?

From our discussions have come three recommendations:

1) We recommend the coordination of the production efforts of the various groups concerned.

2) We recommend that there be a central agency for cataloging available material—films, tapes, clips, etc. Such a catalogue, preferably computer based, must be constantly updated with appropriate additions and even more importantly, appropriate deletions. The Lister Hill Center for Biomedical Communication is the logical setting for these activities. But this will take money. We remind you that for this positive political action is needed.

3) We recommend that there be a process for critical review of existing materials and of new ones as they are produced. Again, the Lister Hill Center for

Max Michael, Jr., M.D., *Assistant Dean, College of Medicine, University of Florida, Executive Director, Jackson Hospitals Education Programs, Inc. Jacksonville, Florida*

Biomedical Communication should serve as the focal point.

Appropriate organizations such as The American College of Physicians, The Association for Hospital Medical Education, The American Academy of Orthopedic Surgery, and The American College of Surgeons, should furnish the expertise for this Herculean task.

To summarize, we feel that audiovisual media, like motherhood, cannot be opposed. But in a positive fashion these must be --

a) better prepared, which means planning for needs;
b) relevant;
c) readily accessible;
d) constantly updated;
e) used more widely, more wisely, and more imaginatively.

Finally, we must not be swept away by the marvels of the electronic gear constantly appearing to the complete exclusion of existing methods. We must always reckon with the fact that the quality of material takes precedence.

REPORT OF THE NEEDS IN CONTINUING EDUCATION PANEL SESSION

Norman E. Tucker

Summary

An heterogeneous group of approximately 75 conferees indulged in a very lively and revealing two-hour discussion on the needs and suggested solutions to some of these requirements in the use of audiovisuals in continuing medical education.

It was unanimously agreed that there was no "standard" physician, thus, the prospect of a singular AV to meet this need was most remote. Further, the physician wanted his continuing education served to him innoculated with three criteria: namely, what he wanted, when he wanted it, and where it was most convenient for him.

Thus, it was concluded that producers of AV materials would necessarily have to approach this market utilizing several modes and each product should be so devised. Further, that the producers realize that for the busy practicing physician a great deal more sophistication would be demanded.

For the most part, it was acclaimed that there was a voluminous amount of software that could be of value to the MD but that no central reservoir or conduit was in existence to provide the flow of knowledge to the practicing physician market. Therefore, much discussion resulted in the strong recommendation that a "single or national resource" be created to fulfill this timely need. This agency should be Federal, but not the controller or the warehouse for the products. Merely a place where a request could be fulfilled post-haste. It may also serve as the abstractor, evaluator, and categorizer of the software. Finally, such an agency could probably transfer the software from one form to another to provide application to all of the popularly employed media.

One innovative use of a current medium which enjoyed a vast amount of receptive discussion was EVR. Everyone seems to be extremely well impressed by its application and flexibility in the AV world. Of course, it will not be a panacea for all AV needs, but as the costs come down, as color (such as they are now employing in England), and the potentialities are tested, the future prospects for EVR seem bright. It was strongly recommended that the buyers in the AV market give the utmost consideration to this medium.

Next, the conferees directed their discussions toward the all-important issue of "Involvement" in AV's. It was concluded that too many AV's are similar to the minister preaching a Sunday morning service—all information goes one way only. All AV's it was agreed, should incorporate this involvement. The new slow-scan TV program at the Unversity of Wisconsin, is being inaugurated to provide such a factor. Other media with an educational stamp are needed that will also provide this involvement.

Finally, much verbal attention was shunted into the allied health fields. Good AV's and software in this area are needed. When allied health personnel are well informed with the latest information, this becomes a strong motivation for the physicians in their health team to seek continuing education to maintain their role as leader. There was general agreement that much software is available and the same

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requirement for a single repository and distribution system was sorely needed.

In summary, this interplay of the conferees in this Panel Session resulted in the obvious cliche that like "sliced bread and indoor plumbing" AV's are here to stay. There are a number of good products of software in both the medical and allied health fields, but greater sophistication is required by the producers, software to be applicable to multiple machines, and a central agency are but a few of the problems with us now. Further, in view of the difficulties associated with evaluating (which is a vital need), sorting and carrying the staggering amount of AV material now available, it was recommended that energetic efforts to organize instructional material into courses, categories and/or series be encouraged wherever possible.

Each user of AV's should give a serious look at EVR and more employment of multimedia in their presentations is recommended. Too many single AV's only touch the midbrain.

Conclusions

1. Like sliced bread and indoor plumbing, audiovisuals are here to stay.

2. That the mass communication is a mass market approach does not apply to M.D.'s. There is no such animal as a standard physician.

3. That TV like many other AV's only hits the midbrain area.

4. That EVR is here and coming on strong. We are about one year behind England . . . So don't wait . . . It is a darned good medium, but not a panacea for all problems. It's elegant—flexible and doctors would use it because it is "doctor proof."

5. There is just oodles of software in both the medical and allied health fields. It needs to be standardized and made available.

6. That some mysterious key is needed to unlock the door to involvement. So much AV is like the minister preaching a sermon, one way only . . . Slow Skan TV might do it. University of Wisconsin will know in a year or so. But there is a definite need for another medium with an educational stamp that will provide involvement.

7. That libraries must become more involved in AV's. There must be a marriage between medical libraries and AV's.

8. That a "MUST" is to get production sophistication into AV's.

9. That the multi-media approach causes a motivational stiumlus which is good.

10. Motivation by recertification of physicians was only mentioned once and is not to be construed as either a conclusion or recommendation.

Recommendations

1. That a "Single or National Resource" be established to:
   a. make AV's known;
   b. serve as a place from which distribution can be made. Not necessarily a warehouse but a focus where requests could be sent;

c. serve as a center where descriptions could be obtained and categories identified as either clinical procedures or research.

It should provide evaluations of content, use or technical recommendations. It may be located in Federal Government but not controlled by it or the warehouse for it.

Such a resource is also needed for allied health AV software.

2. That the educational institutions involved in continuing education of physicians and the allied health fields set up standards for audiovisual equipment to allow for nationwide interchange and distribution of informational and educational materials.

3. It is strongly recommended that all media produced incorporate some form or mechanism of personal involvement in the learning process.

   Examples could be such things as:
   a. Post-exposure moderator-led discussion.
   b. Programmed instruction.
   c. Communication directly with the expert or a responder, even a computer.
   d. A post exposure test.

4. That producers of "software" make it available in several different forms suitable for self-instruction to members of the health profession.

5. That potential producers of AV programs, the members of health professions faculties, continuing education committees of professional societies, etc., need to be informed and educated about the use of various media. These are the people upon whom we depend ultimately to provide us with a great deal of the software we require. This objective might be achieved through faculty workshops on programming for the various media, panels and demonstrations at professional meetings and wide distribution of various prototypes in various areas.

6. That each of us involved in the production of teaching programs, before getting too far along in our planning, do some real soul-searching. Are we really doing this program to fill a needed void or are we doing it for our own personal or group ego?

7. In view of the difficulties associated with evaluating, sorting and sharing the staggering amount of AV material now available, it is recommended that efforts to organize instructional materials in courses or series concerning specific subjects utilizing multi-media be encouraged by various groups—medical schools, governmental, educational and commercial organizations.

SUMMATION AND RECOMMENDATIONS

Rafael C. Sanchez

On August 6-8, 1969 a group of professionals, numbering over 300, concerned with the production and utilization of audiovisuals met in Birmingham, Alabama to pursue the objective of:

> *"Resolving some of the tremendous disparity which exists among medical educators in their knowledge and utilization of audiovisual aids as educational tools and to define the role of the learning resource centers as they relate to medical education centers and hospital environments."*

I am not sure how well the disparity has been resolved nor the confusion cleared. Only time will tell whether individual bias was softened or reinforced.

The important thing is that ideas were defined, the role of the learning resource center was more clearly articulated and therefore there would seem to result some rededication to the increased utilization of audiovisual aids as educational tools.

In the wide variety of presentations given, several ideas appeared with enough frequency to demonstrate emphasis.

Dr. Margaret Klapper in her introductory remarks, speaking of establishing objectives, said:

> *"A guiding principle in education is that only after first identifying the objective should the methods and techniques be selected by which to achieve the objective. A second principle is that no one teaching method or technique should be considered in isolation. Audiovisuals are extensions of the individual teacher, not a replacement of what in the past has proven serviceable."*

As extensions of the teacher, selection of audiovisual aids must be natural to the teacher and appropriate to the learning objectives. They should be used only when the teacher is comfortable using audiovisual aids and only when they help accomplish objectives.

Concern for education primarily was a point of emphasis by Dr. John J. Sharry. He was quick to point out that since World War II, teaching has not been the major preoccupation of universities. Research has been the favorite child so that faculty qualifications have related to grantsmanship, investigation and then only incidentally to the art and skill of communication.

Dr. James Dyson in his discussion alluded to the same problem when he said, "This emphasis has resulted in a faculty selection process away from the practicing physician model toward the research scientist model."

Dr. Sharry made a plea for reason. A plea for reason in evaluation; for reason in recognizing attributes of imagination, creativity, persuasiveness, motivation and integrity; for reason in funding and realistic commitment in support of facilities and personnel which can provide quality programs; for reason in identifying and rewarding good teachers.

In his Keynote Address, President Joseph F. Volker voiced evidence of such reasonable concern as well as support for these things. Most important was his

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Rafael C. Sanchez, M.D. *Director, Division Continuing Medical Education, Louisiana State University School of Medicine, New Orleans, Louisiana* commitment of the University in support of education not only at the undergraduate level but to the level of public education and including continuing education.

A review of the Pros and Cons of visual systems by Mr. Robert S. Craig presented a panorama of qualities relating to television, movies and still photography. The motion category providing the dynamic, rhythmic quality with combined sound and sight and the still category being simple and inexpensive.

Here participants were introduced to two new concepts:

1. Electronic Video Recording known as EVR offers a medium of great flexibility and capacity for conversion to any type of sound visual system. This versatile new system appears to have great promise when it is released next year.

2. Compressed speech is an interesting new concept. Even with allowances for a better setting it will probably be uncomfortable for the listener. Perhaps it requires a decompressed cerebral cortex.

Halography, lasers, and visual maker kits were among some of the innovations in still photography which were discussed.

Application of audiovisual techniques do not happen by accident. To be successful audiovisual must be used with skill, said Dr. Norman Cole. The waste of equipment lying idle in store rooms must be eliminated. Selection of audiovisual equipment must be based on firmly established needs.

The afternoon session later brought forth a magnificent demonstration of an audiovisual. One of the finest photographic and artistically constructed sound, still and movie demonstrations we have ever seen was presented by Mr. Eugene Murphy and Mr. James Parker.

It was so impressive that I heard one of our participants say that he found it discouraging because he knew he could never approach such a level of excellence.

The opening presentations seemed to give considerable attention to TV as being perhaps the more noteworthy medium.

The impressive figures showing change in viewing habits from 1959 to 1968, however, were not totally convincing. Sure the average American may be watching TV 2½ hours a day—but he is watching news and sports and variety shows—Dean Martin, Johnny Carson and W. C. Fields movies. It wasn't brought into the discussion, but I overheard several comments about empty rooms and lonely monitors in many places.

Recently the following letter about a television program came to my attention.

August 1, 1969

Dear Doctor:

I must apologize for delaying so long before sending you the information you requested regarding the close circuit TV Program held on June 11. But perhaps this report will be of some value.

I contacted (by phone) a volunteer in each of the following cities: M______, S______, A______, B______, L______ and C______. Each person was to have attended the TV showing, get the data needed and send us a report. We received only two replies—one from M______ stating that the program would not be shown because the TV was broken—the other from S______, informing us that because of a heavy teaching schedule no one would be able to attend.

In New Orleans:

X Medical School—has television sets in many rooms where staff, students, etc. may view a program if they wish. The auditorium would not be used unless there was a special request made.

Y Hospital—there was a meeting scheduled in the auditorium and the program would not be shown.

Z Medical School—the auditorium could be used only by request.

After receiving this information from Z Medical School I requested the showing be held in the auditorium at Z Medical School. I posted a large notice in the lobby of Y Hospital, stating the date, time and place of the program.

Mrs. B. and I attended. Unfortunately we were the only ones there.

The members of the ABC Association at X School could not attend because they were seeing patients at that time.

It was my observation that although these medical programs are held continuously, there was no one in the auditorium when we arrived, the lights were not on and one got the impression that the room had not been used that day.

Mrs. B. and I found the program most interesting. Too bad there weren't more viewers.

Yours very truly,

A______ M______

The effort to resolve the disparity of opinion regarding Standardization seemed not to succeed any better than the effort made in Chicago recently at the Audiovisual Conference of Medical and Allied Sciences when they tried to settle the 8mm film format problem.

It was interesting that Dr. Edward C. Rosenow in giving the consumer's point of view emphasized the desirability of competition and the role of free enterprise in giving us better products.

Care in selecting equipment for usefulness of purpose rather than impressiveness of gadgetry was also a concern of Dr. Rosenow.

He went on to say that if as consumers we want standardization, adequate funding can force the audiovisual market into the area of producing the most practical and useful pieces of equipment.

Dr. Rosenow also pointed out what I feel is a most important need. Physicians must have help in articulating their learning needs and deficiencies, so they can participate in structuring their own educational objectives. The American College of Physicians has made a valuable contribution in this area.

Another point of emphasis here was the need for the establishment of a national resource center to catalogue, provide information about and give assistance in selecting and identifying suitable audiovisuals.

The manufacturers' point of view moved in favor of standardization of cartridge sound motion picture equipment on the side of Super 8—magnetic sound with image to sound separation of plus 18 frames.

In the area of TV, little hope of standardization seemed to exist. There are only signs of some promise for at least settling on a specific variety of tape widths.

Perhaps standardization must wait for a resolution of the conflict and lack of coordination which exists between the needs and desires of the consumers versus the producers.

BASIC SCIENCE EDUCATION AND AUDIOVISUALS

"At an undergraduate level TV affords opportunity for manpower saving," said Dr. William G. Walter. Its an answer to increased student load, poor housing (facilities) and teacher shortage. Besides it allows for demonstrations which can be seen and heard better. Its main shortcoming is reduced personal contact.

It tends to enhance self-study attitudes and techniques—which may be of value in the area of CME later.

Mr. Melvin C. Shaffer's experience at the Medical College of Virginia was similar to that at Montana State University regarding manpower surveys.

Dr. Merlyn C. Herrick reported what seemed to be a suitable solution to the hardware problem in computer assisted instruction. Its capabilities of linear or branched frame presentation, memory and timing plus its reasonable cost make it an interesting contribution to this audiovisual dimension.

Modules of information containing primarily factual material were described by Mr. Louis G. Audette as a solution for crowded curriculums and restrictions of traditional teaching. The module represents a specific segment of information capable of data bank storage. It can be modified, discarded or added to as knowledge grows. It can be combined with other modules and used in a variety of disciplines. It seems a logical basic unit for the Learning Resource Center of the future with its central computers, dial access, videotape and EVR. Modules are therefore available at any time and transmittable to any place.

USE OF AUDIOVISUALS IN CLINICAL TEACHING

To meet the needs of the clinician it is necessary to relate subject matter to the task of assisting the doctor in meeting his responsibility to provide the highest level of health care commensurate with contemporary economic ability.

Dr. Dyson suggested that "Whenever a learning unit—of any size—is planned, a representative of all groups that would be affected by the learning unit—directly or indirectly—should be involved in planning from the beginning."

Faculty resistance to change, communications lag and the new generation of students were the subject of Mrs. Marion Johnson's discussion. Yet another dimension of the Learning Resource Center as an audiovisual production center was discussed by Mrs. Johnson. It involves unqualified administration support, adequate funding and centralization of staff.

Lt. Col. George Caras described a tight system of controls for audiovisual distribution based on military procedures and applying fundamental logistical dimensions. Professional well trained staff, standardization, coordination, strict inventories, updating of inventories and a review committee were characteristics of the structure.

That evaluation is a critical component of the educational process has long been acknowledged as a fact. Dr. Frank L. Husted, in his presentation provided a refreshing attitude for those of us who worry about measurements. Dr. Husted went on to say, "Evaluation is a continuous progression on interdependent steps in which the objectives of an educative effort are formulated, standards of acceptable performance are established, measurements are made, results are interpreted to determine the extent to which the educational complex has contributed to modifying student behavior in the direction indicated by the objectives."One does not measure," he went on to say, "the extent to which a student has progressed or changed toward an objective. Measurements can do no more than 'sample' the student's behavior at one moment in time, thereby supplying data from which inferences can be drawn in terms of the objectives and their supporting criteria."

AUDIOVISUALS IN TEACHING HOSPITALS

Relevance was the theme of Mr. Ted Kummer's offering. Practicality, adherence to sound education theory, focus on common problems, brevity and quality of design, identification of objectives, a proper learning environment and an opportunity for discussion were all important characteristics to assure relevance.

Dr. Lamar Crevasse reported a successful television project in his region which was demonstrative of some of the qualities of TV, especially when planned in response to learner's needs.

The panel agreed that every community hospital regardless of size should have an organized program of CME for all members of the health care team. It should have a functional library with a basic yet comprehensive collection of books and journals of the type described by Dr. Norman Stearns.

A solution to the disparity in production and distribution problems was offered in the suggestion made to educators to have them become a political force capable of influencing legislators concerning the health science educational needs. The discussion took the tone of looking on industry as an expensive and unreasonable answer to educational needs and that government could serve these needs more efficiently. An alternative suggested that needs and guidelines might better be determined by the teaching institutions. Government might play a more effective role in being a catalyst and enhancing the effort of the university.

MEETING THE NEEDS IN CONTINUING EDUCATION

The television story emphasized its qualities of broadcast, image magnification, multiduplication, transport, storage and many others. Expense and lack of standardization were its acknowledged shortcomings.

Many problems relate to the question of whether audiovisuals satisfy the demand for individualized continuing education.

To have meaning, physicians' questions that relate to practice, need to be answered now—at a convenient place, close to home and still allow some leisure in an already crowded schedule.

Directories are not satisfactory. On time opportunities for self-paced instruction, self-assessment and information call up are not available. There is much to be desired in the reaction of the academic community to continuing education needs of the practicing physician.

Dr. Thomas C. Meyer reported on what is perhaps the most diversified and comprehensive of such programs. The Wisconsin offerings in the field include:

Medical Dial Access Library, Single concept films and telephone/radio conferences which reach 77 hospitals.

A promising concept is their investigation of the means by which physicians in community hospitals can attend conferences held in the medical center by means of slow-scan television.

Regional Medical Programs have encouraged support for the field of CME. Dr. Phyllis E. Carns reported more than half of funded projects being classed as CME, about 40% of these had audiovisual components.

Dr. Rosenow previously spoke about RMP's contribution away from standardization by encouraging regions to do their own thing.

Teleconsultation was an interesting section of Dr. Shamaskin's presentation. Not a new concept, it still offers a setting for exchange of information between hospitals.

Although we were exposed to a wide variety of media—from very simple to quite complex—there seemed to be a level of agreement that effective audiovisual is:

1. Simple
2. Well designed
3. Focus directly on subject
4. Short if time is involved
5. "HOW TO" instruction
6. Single concept
7. Relevant

There was also agreement that good audiovisuals must be used in accord with and reflect established principles of learning theory. As an extension of the teacher, they should motivate, be appropriate and include reward for the teacher as well as the learner. Audiovisuals must have meaning, be individual and reinforce through repetition. They must allow for learner participation, expression and discovery. It must be applicable to new tasks. Goals must be realistic and include bilateral involvement of teacher and learner. Finally and most important, good audiovisuals must be relevant.

The following passage offers eloquent evidence to the importance of relevance:

> *"A Dear Teacher—Some of the most persistent of modern fallacies are those which surround the so-called 'explosion of knowledge.' One fallacy is to equate knowledge with the assimilation of facts. If this is knowledge then we should be filling our most responsible posts with newly qualified doctors, for we are never so stuffed with facts as on the day we graduate. But what use is all this knowledge until it has been leavened by experience? A clinician knows nothing until he has begun to study sick people for himself. Even if he could read every article in the medical literature it would avail him little unless he was able to relate it to his own experience.*
>
> *A clinician's skill in maturity depends on the use he has made of his experience. Some learn from every case they see; others go on repeating the same mistakes to the end of their days. A doctor's chief teachers, says Osler, are his patients; and he goes on, 'A man who has seen 500 cases of pneumonia may not have the understanding of the disease which comes with the intelligent study of a score of patients, so different are knowledge and wisdom . . .' No book, no journal, and no refresher course can teach a doctor so well as the critical study of his own patients. Doctors learn best when they talk to each other about some shared experience. This is why preventing doctors from looking after their own patients in hospital produces stunted clinicians. The defect of the standard refresher course is that teacher and taught are usually trying to communicate across a chasm of unrelated experience." McWhinney, I.R.: Personal View, Brit Med J 3:488 (May 25) 1968.*

RECOMMENDATIONS

1. A national resource center is needed to serve as a repository for information about available audiovisuals. This would include an up-to-date catalogue and offer consultation and assistance in the utilization of audiovisuals.

2. Periodic conferences of this type should be held. Further considerations should:
   A. Emphasize a format to influence and hasten the return to clinical teaching

B. Include more learners in the planning and implementation of the conference

3. Opportunities should be provided whereby learner needs and wants can be more effectively identified and teaching objectives more clearly defined.

4. Educators must exert leadership in setting up standards and guidelines for selection and utilization of audiovisual media.

CLOSING REMARKS BY DR. MEADOR

I'd just like to make two observations, first—I'm struck by the diversity of backgrounds that have come to this conference and which I think has led to a freshness and a willingness to look at the negative as well as positive aspects of audiovisuals. This leads to my second observation—that is that there has been an openness and a frankness and a willingness to look at the humorous side of things as witnessed this morning which I think has been healthy and has not led to an over-selling of audiovisuals. As one of those who has to participate in budgeting, now I think I have some facts at hand. I would like to thank the participants, the speakers, the coordinators and the directors of this conference on behalf of the University of Alabama for doing such an outstanding job. I think the many negative aspects that have been brought out are just as important as the positive aspects much as in a medical history the negative aspects are just as important as the positive aspects.

If you have any difficulty getting out of town, I'm sure that Dr. Klapper and her staff will be available throughout the afternoon to help in any way. Thanks to all of you.

NATIONAL CONFERENCE ON THE USE OF AUDIOVISUALS IN MEDICAL EDUCATION

Special Demonstrations

Techniques of Medical Interviewing

A program developed by the University of Southern California School of Medicine Department of Psychiatry consists of a series of programs depicting techniques of medical interviewing. These programs utilize videotaping combined with programmed instruction. Actual case histories are enacted by professional models and actors. The total showing time for the 10 interviews is four hours. Each interview utilizes a different interviewing technique. The films were prepared by Drs. Allen Enelow, Leta McKinney Adler, and Murray Wexler.

Applications of Computers in Audiovisual Media—Dr. William Harless (discussant)

1. A computer-generated film illustrating techniques of production, of the production of movies from computers by Bell Laboratories.

2. A film illustrating the use of computers in the preparation of cardiac models including motion by means of computer graphics from Aerospace Corporation.

3. Sim 1 – Computerized mannequin for anesthesiology, prepared by Dr. Stephen Abrahamson at the University of Southern California.

Communications in Postgraduate Medical Education

Dial access system—Dr. Thomas C. Meyer.

A means of providing immediate access to current, pertinent and emergency information to physicians in the state on a 24-hour basis—the Medical—Access Library.

The Beating Heart—Harold Rydberg

A cardiac model designed to beat, prepared in the Illustration and Design Department, Office of Learning Resources, University of Alabama in Birmingham.

NATIONAL CONFERENCE OF THE USE OF AUDIOVISUALS IN MEDICAL EDUCATION

Technical Exhibits

ARION PRODUCTS CORPORATION
825 Boone Avenue North, Minneapolis, Minnesota 55427
(612) 544-8622
Exhibiting: Command Performer systems for programming and control of multi-screen. Multi-projection by automation or remote control.
Personnel: Mr. M. V. (Bud) Mickelsen

DIDACTIC CORPORATION
700 Grace Street, Mansfield, Ohio 44901
(419) 525-2368
Exhibiting: The Didactor—a special purpose computer with multi-media control capability.
Personnel: Mr. David L. Carto

EASTMAN KODAK COMPANY
1775 Commerce Drive N.W., Atlanta, Georgia 30318
(404) 351-6510
Exhibiting: 16mm and super 8mm equipment and accessories, 35mm Ektagraphic slide projectors and accessories, Ektalite screen.
Personnel: Mr. Eugene M. Murphy, Mr. Elmo Clark, Mr. Bob Messenger, and Mr. Skip Millor.

FAIRCHILD CAMERA & INSTRUMENT CORPORATION, INDUSTRIAL PRODUCTS DIVISION
221 Fairchild Avenue, Plainview, New York 11803
(516) 938-9600
Exhibiting: Movie Pak 8mm sound automatic cartridge loading motion picture projection equipment and materials.
Personnel: Mr. Mel Waterbor

GUILD FOR EDUCATIONAL TECHNOLOGY
(Medical Film Guild, Ltd.)
506 West 57th Street, New York, New York 10019
(212) Circle 7-0510
Exhibiting: Systems in Education and Training which conserve Time — Energy — and increase Program Productivity.
Personnel: Mr. Joseph P. Hackel

MINNESOTA MINING & MANUFACTURING COMPANY
3M Center, Building 220-5B, Saint Paul, Minnesota 55101
(612) 733-4363
Exhibiting: "Sound-on-slide" projection equipment; Wollensak tape recorders; video recorders; tape libraries and accessories.
Personnel: Mr. Bob Kline, Mr. S. E. West

NASCO
Fort Atkinson, Wisconsin 53538
(414) 563-2446
Exhibiting: Overhead and Opaque Projectors
Personnel: Mr. A. E. Haller

NORTH AMERICAN PHILIPS CORPORATION
(Norelco)
100 E. 42nd Street, New York, New York 10017
(212) 697-3600
Exhibiting: LCH1000 cassette series; EL 9000 Programmed Learning units; FM wireless learning systems; practronics
Personnel: Mr. Marvin Buchanan

RADIENT SCREEN AND SALES COMPANY
8220 North Austin Avenue, Morton Grove, Illinois 60053
(312) 966-4200
Exhibiting: Cassette Tape Recorders and Accessories
Personnel: Mr. Seymour Jacob

RECORDEX CORPORATION
3227 Cains Hill Place, Atlanta, Georgia 30305
(404) 237-7000
Exhibiting: High speed cassette to cassette duplicator; high speed reel to cassette duplicator; high speed cassette winder
Personnel: Mr. W. R. Mathews, Mr. W. A. Cottrell, Jr.

SIGNAL ENGINEERING AND SALES
4620 5th Avenue South, Birmingham, Alabama
(205) 595-8484
Exhibiting: Sony video tape recording and related equipment
Personnel: Mr. Roy Isbell

TECHNICOLOR, INCORPORATED
342 Madison Avenue, New York, New York 10017
(212) 661-4833
Exhibiting: Super 8 and 8mm instant cartridge loading optical sound and silent movie projectors; 8mm sound and silent motion picture lab service; Vidtronics tape to film transfer capability.
Personnel: Mr. Joseph Cavanaugh, Mr. Tony Saunders

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4620 Fifth Avenue, South
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